ASUS

ESC500 G2
Workstation
User Manual

E7407

First Edition
May 2012

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Notices

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

• This device may not cause harmful interference, and
• This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

> **WARNING!** The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This Class B digital apparatus complies with Canadian ICES-003.

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we publish the chemical substances in our products at ASUS REACH website at http://green.asus.com/english/REACH.htm.

Safety information

Electrical Safety

- Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing any additional devices to or from the system, contact a qualified service technician or your dealer. Ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you service.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

Operation Safety

- Servicing of this product or units is to be performed by trained service personnel only.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, make sure all cables are correctly connected and the power cables are not damaged. If any damage is detected, contact your dealer as soon as possible.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Place the server on a stable surface.

> ⚠ This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable with a properly grounded electrical outlet to avoid electrical shock.

Lithium-Ion Battery Warning

CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

CD-ROM Drive Safety Warning

CLASS 1 LASER PRODUCT

Heavy System

CAUTION! This server system is heavy. Ask for assistance when moving or carrying the system.

DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

About this guide

Audience

This user guide is intended for system integrators and experienced users with at least basic knowledge of configuring a workstation.

Contents

This guide contains the following parts:

1. **Chapter 1: Product Introduction**

    This chapter describes the general features of the workstation, including sections on front panel and rear panel specifications.

2. **Chapter 2: Hardware setup**

    This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

3. **Chapter 3: Motherboard information**

    This chapter gives information about the motherboard that comes with the workstation. This chapter includes the motherboard layout, jumper settings, and connector locations.

4. **Chapter 4: BIOS information**

    This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

5. **Chapter 5: RAID configuration**

    This chapter provides information on how to configure your hard disk drives as RAID sets.

6. **Chapter 6: Driver installation**

    This chapter provides information on how to install the drivers for system components. This chapter also describes the software applications that the barebone workstation supports.

7. **Appendix: Reference information**

    This section provides a troubleshooting guide for solving common problems when using the barebone workstation.

Conventions

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and information to aid in completing a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.
	Example: <Enter> means that you must press the Enter or Return key.
<Key1+Key2+Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).
	Example: <Ctrl+Alt+Del>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.
	Example: At the DOS prompt, type the command line: `format A:/S`

Reference

Visit the ASUS websites worldwide that provide updated information for all ASUS hardware and software products. Refer to the ASUS contact information for details.

Chapter 1

This chapter describes the general features of the workstation, including sections on front panel and rear panel specifications.

Product introduction

1.1 System package contents

Check your system package for the following items.

Model Name	ESC500 G2
Chassis	ASUS T10A Pedestal Chassis
Motherboard	ASUS P8C WS
Component	1 x 500W/700W 80Plus Single Power Supply, Bronze/Silver
	1 x 120x120mm System Fan
	1 x Intel® LGA1155 CPU Cooler
Accessories	1 x ASUS ESC500 G2 User's Guide
	1 x ESC500 G2 Support DVD
	1 x Windows 7 Professional Recovery DVD 32-Bit (for OS bundled SKU)
	1 x Windows 7 Professional Recovery DVD 64-Bit (for OS bundled SKU)
	1 x AC Power Cable
	1 x COM Port Cable
	1 x DVI-TO-VGA converter
Optional Items	Smart Card Reader

If any of the above items is damaged or missing, contact your retailer.

1.2 Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the product's serial number containing 14 characters such as xxS0xxxxxxxxxx shown as the figure below. With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.
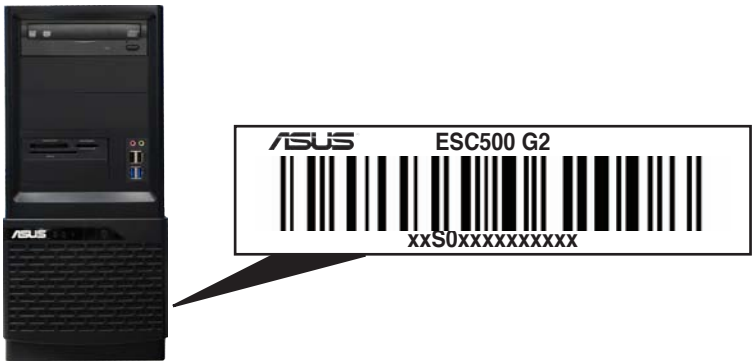
1.3 System specifications

The ASUS ESC500 G2 is a workstation featuring the ASUS P8C WS motherboard. The workstation supports Intel® LGA1155 Xeon® E3-1200 v2 or 3rd/2nd Generation Core™ i3 Processors, plus other latest technologies through the chipsets onboard.

Model Name		ESC500 G2
Operating System		Genuine Windows® 7 Professional.
Processor / System Bus supported		1 x Socket LGA1155
		Intel® Xeon® E3-1200 v2 Processor Family
		Intel® 3rd/2nd Generation Core™ i3 Processors
		Intel® Xeon® E3-1200 Processor Family
		Intel® Core™ i3-2100 Processor Family
		Intel® Core™ G8x0 Processor Family
		Intel® Core™ G6x0 Processor Family
Core Logic		Intel® C216 Express Chipset
Memory	**Total Slots**	4 DIMMs (2 Channels)
	Capacity	Maximum up to 32GB
	Memory Type	DDR3 1066/1333/1600 ECC/non-ECC UDIMM
		* Refer to www.asus.com for detail memory AVL & CPU support list
	Memory Size	1GB, 2GB, 4GB, 8GB (UDIMM)
Expansion Slots	**Total PCI/PCI-X/PCI-E Slots**	6
	Slot Type	1 x PCIe 3.0 x16 (at x16/x8 mode)
		1 x PCIe 3.0 x16 (at x8 mode)
		2 x PCIe 2.0 x16 (at x4 mode)
		1 x PCIe 2.0 x1 (at x1 mode)
		1 x PCI
Storage	**SATA Controller**	Intel® C216:
		2 SATA 6.0 Gb/s ports (gray)
		4 SATA 3.0 Gb/s ports (blue)
		Intel® Rapid Storage Technology (for Windows only)
		(Support software RAID 0, 1, 10 & 5)
HDD Bays		3 x Internal 3.5" HDD Bays
Networking	**LAN**	2 x Intel® 82574L Gigabit LAN controller

(continued on the next page)

Graphic	**VGA**	VGA Output DVI-I ports
		Supports DVI with maximum resolution of 1920 x 1200@60Hz
		Maximum shared memory of 1GB
		*Only enabled with specific processors
Onboard I/O		1 x PS/2 KB/MS port
		1 x S/PDIF Out (Optical and Coaxial)
		6 x USB 2.0/1.1 ports
		2 x USB 3.0/2.0 ports
		1 x IEEE1394a
		2 x RJ-45 ports
		1 x DVI-I port
		1 x 8-channel Audio I/O
Anti-virus Software		Optional Anti-Virus CD Pack
EMI	**Europe (CE, EN55022 & EN55024)**	V
	Taiwan (BSMI)	V
	China (CCC)	V
Dimension (HH x WW x DD)		423mm x 190mm x 435mm
Net Weight Kg (CPU, DRAM & HDD excluded)		10.8 Kg
Power Supply		500W 80Plus Single Power Supply, Bronze 700W 80Plus Single Power Supply, Silver
Environment		Operating temperature: 10°C–35°C Non operating temperature: -40°C–70°C Non operating humidity: 20%–90% (Non-condensing)

1.4 Front panel features

The workstation system displays a simple yet stylish front panel with easily accessible features. The power and reset buttons, LED indicator, optical drive, card reader, and four USB ports are located on the front panel. For future installation of 5.25-inch devices, two drive bays are available.

Optical Drive

Empty 5.25-inch bay

Smart Card Reader (optional)

Microphone / Headphone ports

USB 2.0/USB 3.0 ports

Reset button

Power button

Power LED (blue)
HDD access LED (orange)
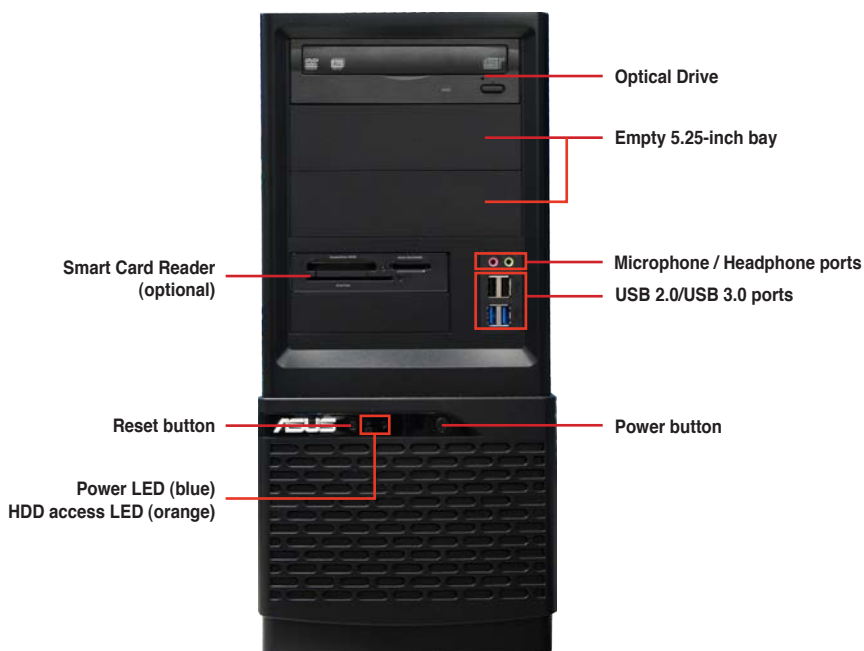
Refer to section **1.7.1 Front panel LED** for the LED descriptions.

1.5   Rear panel features

The rear panel includes a slot for the motherboard rear I/O ports, expansion slots, a power supply module, and a vent for the system fan.

The PS/2 keyboard / mouse combo port, USB ports, DVI-I ports, Audio ports, S/PDIF Out ports, and Gigabit LAN ports do not appear on the rear panel if motherboard is not present.

Power cord connector

Power supply module

Power supply switch

USB 2.0 ports

PS/2 keyboard / mouse port

IEEE 1394a port

System fan

LAN (RJ-45) port 2

Coaxial S/PDIF Out port

Optical S/PDIF Out port

DVI port

USB 3.0 ports

LAN (RJ-45) port 1

Audio I/O ports

Expansion slots
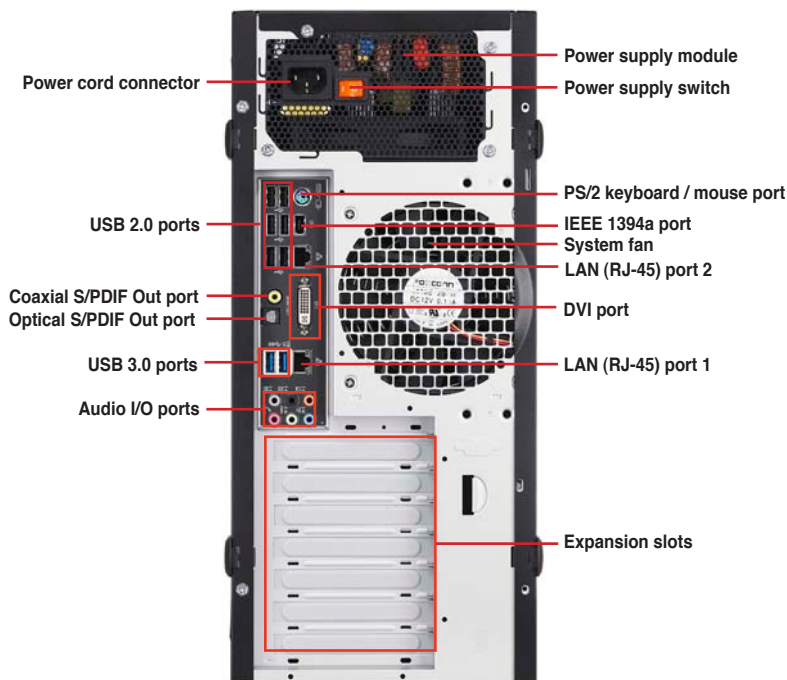
1.6   Internal features

The barebone workstation includes the basic components as shown.
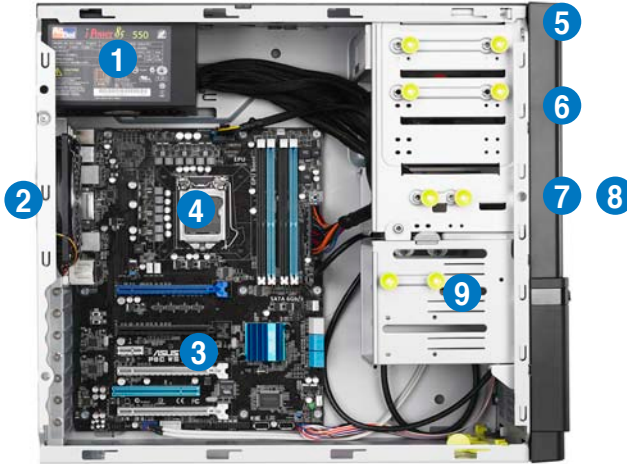
1.   Power supply unit
2.   120mm system fan
3.   ASUS P8C WS motherboard
4.   CPU heatsink and fan assembly
5.   Optical drive (optional)
6.   5.25-inch drive bays
7.   Smart card reader (optional)
8.   Front I/O board
9.   Internal HDD bays

1.7 LED information

1.7.1 Front panel LED

HDD Access LED   Power LED

LED	Color	Display status	Description
Power LED	Blue	ON	System power ON
HDD Access LED	Orange	OFF Blinking	No activity Read/write data into the HDD

1.7.2 LAN (RJ-45) LEDs
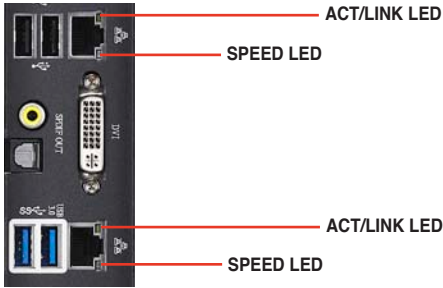
ACT/LINK LED

SPEED LED

ACT/LINK LED

SPEED LED

ACT/LINK LED		SPEED LED	
Status	**Description**	**Status**	**Description**
OFF	No link	OFF	10 Mbps connection
YELLOW	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

Chapter 2

This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

Hardware setup

2.1 Chassis cover

You have to remove the left side cover to install or replace internal components of the server system.

⚠ • Ensure that you unplug the power cord before removing the side cover.

• Take extra care when removing the side cover. Keep your fingers from components inside the chassis that can cause injury, such as the CPU fan, rear fan, and other sharp-edged parts.

To remove the left side cover

1. Remove the two screws that secure the left side cover to the chassis.

2. Unlock the side cover lock.

3. Slide the left side cover for about half an inch toward the rear until it is disengaged from the chassis. Carefully lift the cover and set it aside.

2.2   Motherboard overview

The barebone server comes with the P8C WS motherboard already installed. The motherboard is secured to the chassis by nine (9) screws as indicated by the circles in the illustration below.

Refer to **Chapter 3: Motherboard information** for detailed information on the motherboard.

Place this side towards the rear of the chassis
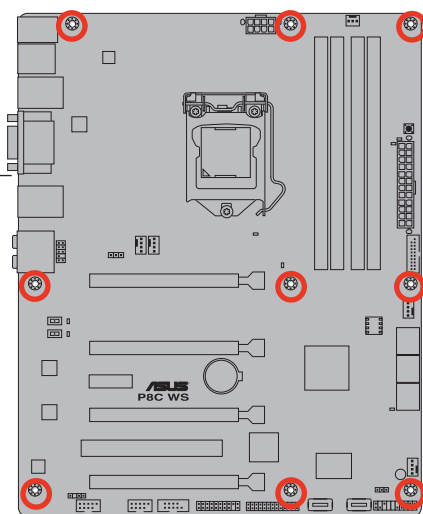
Ensure to unplug the power cord before installing or removing any motherboard component or connection. Failure to do so can cause you physical injury and damage motherboard components.

2.3   Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1155 socket designed for the Intel® 3rd Generation Core™ i3 desktop Processors and Intel® Xeon® E3-1200 v2 series Server/Workstation Processors.
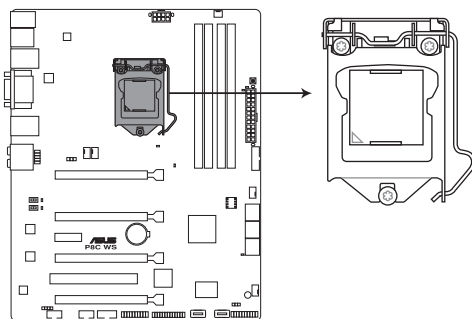
P8C WS CPU LGA1155

Ensure that all power cables are unplugged before installing the CPU.

- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.

- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1155 socket.

- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

2.3.1 CPU installation

Please note the order in opening/ closing the double latch. Follow the instructions printed on the metal sealing hatch or the illustrations shown below in this manual. The plastic cap will pop up automatically once the CPU is in place and the hatch properly sealed down.
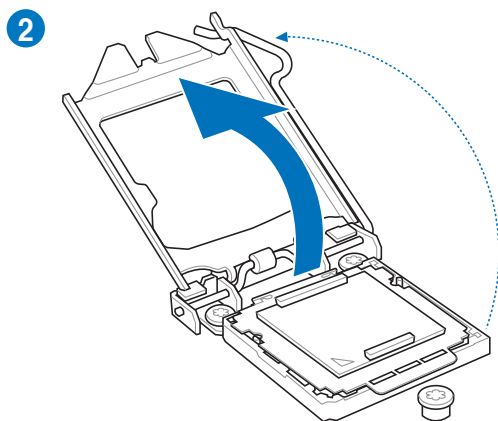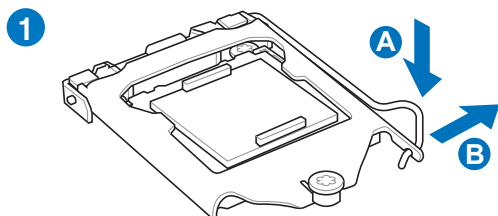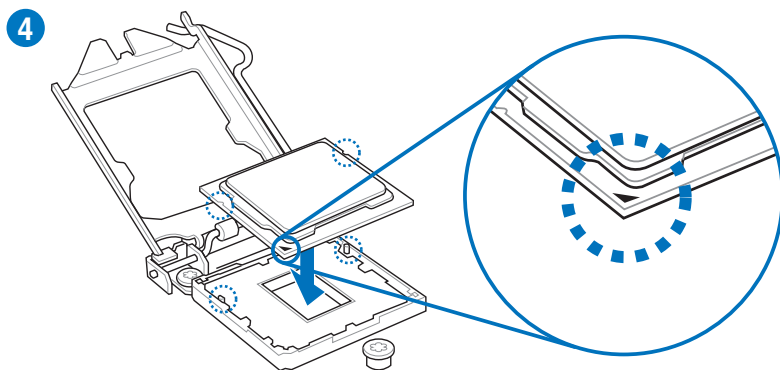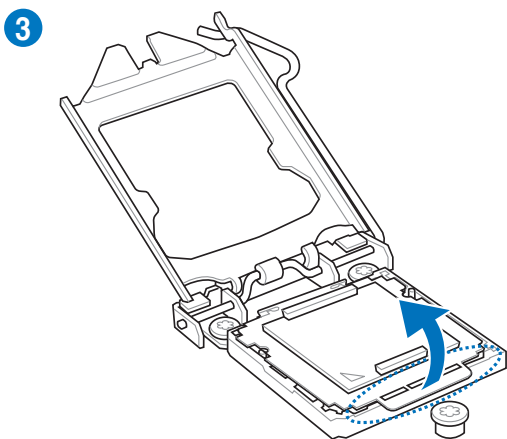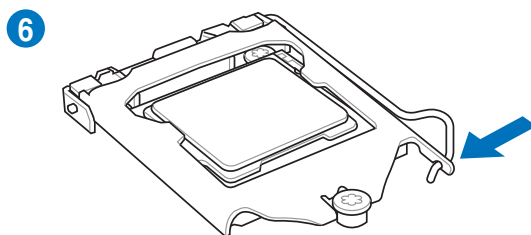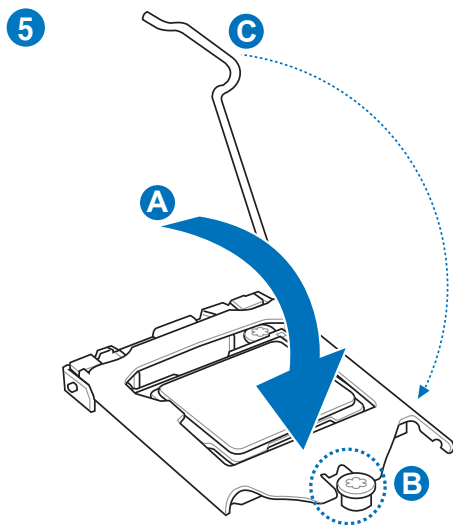
2.3.2 Installing the CPU heatsink and fan assembly
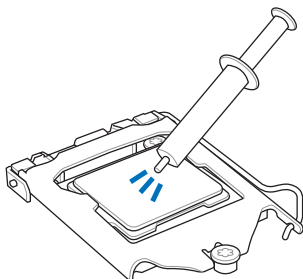
> Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

To install the CPU heatsink and fan assembly
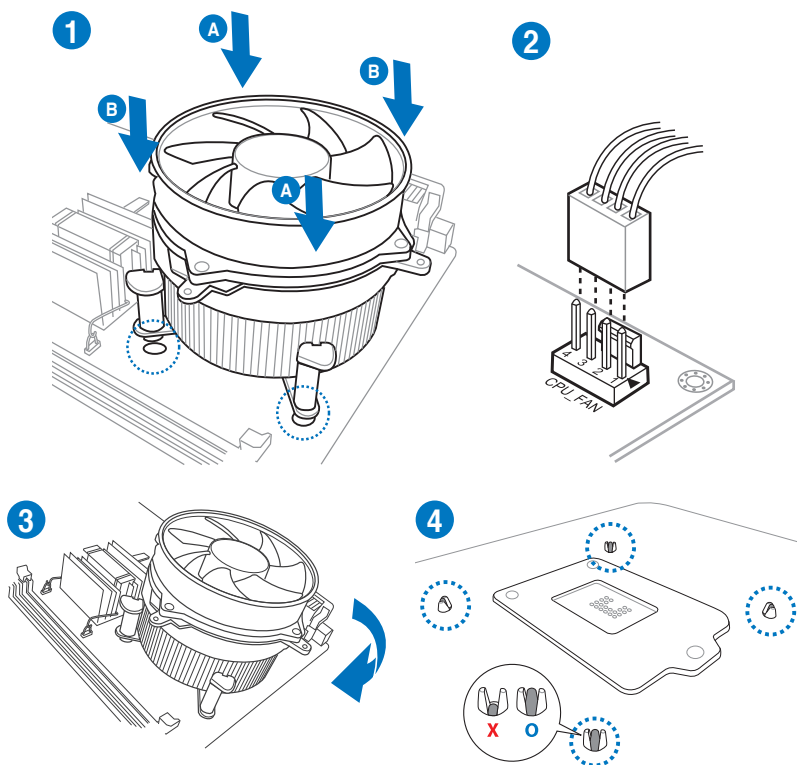
To uninstall the CPU heatsink and fan assembly
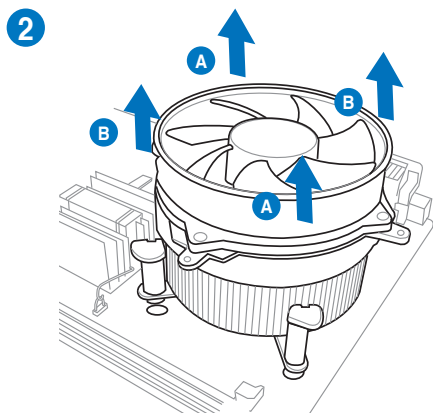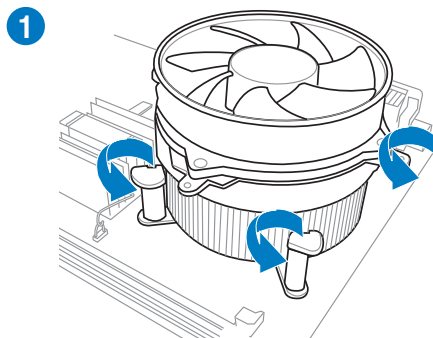
2.4   System memory

2.4.1   Overview

The motherboard comes with four Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) slots.

A DDR3 module is notched differently from a DDR or DDR2 module. DO NOT install a DDR or DDR2 memory module to the DDR3 slot.
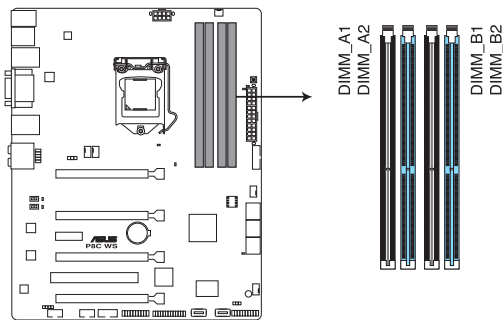
P8C WS 240-pin DDR3 DIMM socket

DIMM_A1
DIMM_A2
DIMM_B1
DIMM_B2

Recommended memory configurations

DIMM_A2

DIMM_A2
DIMM_B2

DIMM_A1
DIMM_A2
DIMM_B1
DIMM_B2
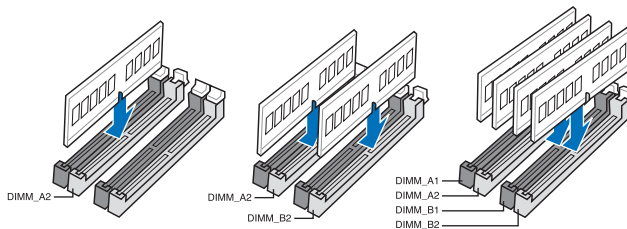
2.4.2   Memory configurations

You may install 1GB, 2GB, 4GB, 8GB unbuffered ECC or non-ECC DDR3 DIMMs into the DIMM sockets depending on the installed CPU.

- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.

- According to Intel CPU spec, DIMM voltage below 1.65V is recommended to protect the CPU.

- **The max. 32GB memory capacity can be supported with DIMMs of 8GB (or** above).

- Always install DIMMs with the same CAS latency. For optimum compatibility, we recommend that you obtain memory modules from the same vendor.

- Due to the memory address limitation on 32-bit Windows OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
  - Use a maximum of 3GB system memory if you are using a 32-bit Windows OS.
  - Install a 64-bit Windows OS when you want to install 4GB or more on the motherboard.
    For more details, refer to the Microsoft® support site at http://support.microsoft.com/kb/929605/en-us.

- This motherboard does not support DIMMs made up of 512Mb (64MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).

For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

P8C WS Motherboard Qualified Vendors Lists (QVL)

- ASUS exclusively provides hyper DIMM support function.

- Hyper DIMM support is subject to the physical characteristics of individual CPUs. Load the X.M.P. settings in the BIOS for the hyper DIMM support.

- Visit the ASUS website for the latest QVL.

2.4.3   Installing a DIMM

⚠️
- Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.
- Always insert the DIMM into the socket VERTICALLY to prevent DIMM notch damage.

☞ A DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.
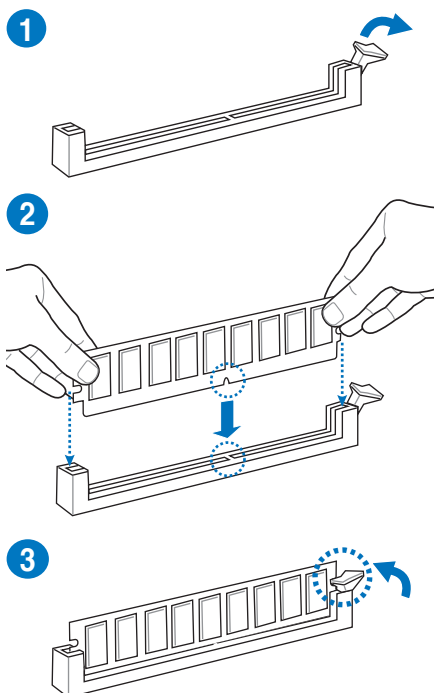
2.4.4.   To remove a DIMM
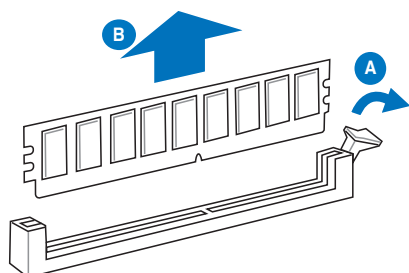
2.5   Installing hard disk drives

The workstation system provides three (3) internal Serial ATA hard disk drive bays.

To install a Serial ATA hard disk drive
1.   Refer to the previous section to remove the side cover.
2.   Pull out the bay locks on the HDD cage.
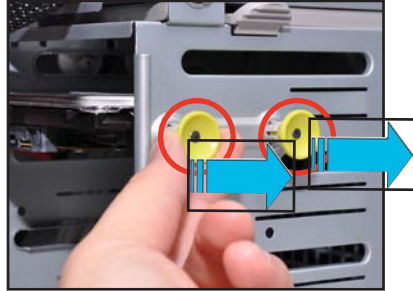
3.   Lift up the secure tab on the HDD cage.
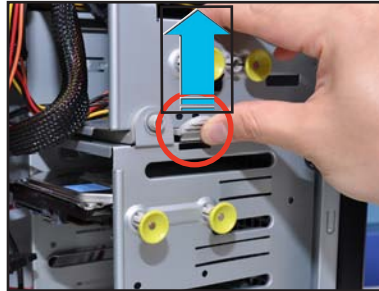
4.   Swing out the HDD cage.
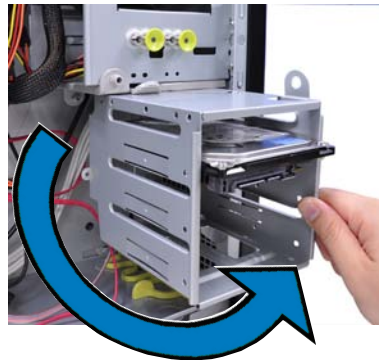
5. With the HDD label side up, carefully insert the drive into the 3.5-inch bay and push the drive into the bay until its screw holes align with the holes on the drive bay.

6. Swing back the HDD cage.

7. Push in the bay locks to secure the hard disk drive.
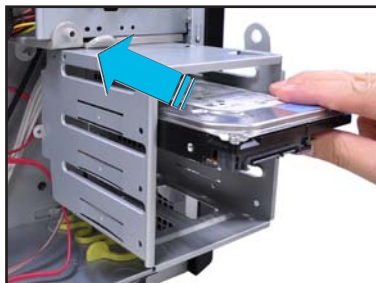
8. Connect a 7-pin SATA cable (from the motherboard SATA port) and a 15-pin power plug (from the power supply unit) to the back connectors of the hard disk drive.

Use either the 15-pin SATA power connector OR the legacy 4-pin power connector. DO NOT use both to prevent damage to components and to keep the system from becoming unstable.

2.6   Installing 5.25-inch drives

Ensure to unplug the power cable before installing or removing any system components. Failure to do so may cause severe damage to the motherboard and other system components!

The system comes with three 5.25-inch drive bays located on the upper front part of the chassis. An optical drive that comes standard/optional with the system package occupies the uppermost bay (labeled 1). The lower bays (labeled 2 and 3) are available for additional 5.25-inch optical, zip, or floppy disk drives.

You must remove the front panel assembly before installing a 5.25-inch drive.
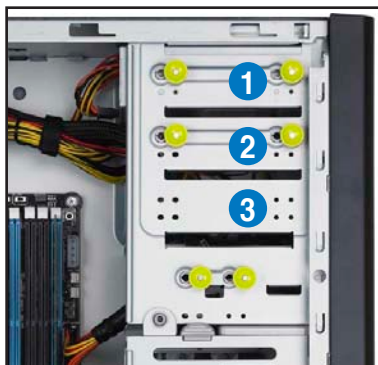
2.6.1   Removing the front panel cover

To remove the front panel cover

1.   Follow the instructions in section **2.1 Chassis cover** to remove the side cover. Locate the front panel assembly lock, then move it outward to unlock the front panel.
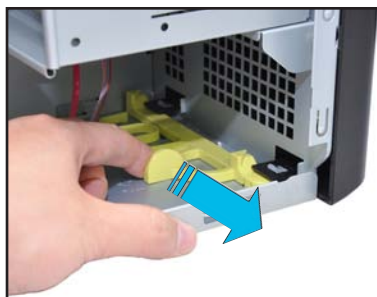
2.   Gently lift the front panel assembly until the hinge-like tabs on the top side of the assembly are detached from the chassis.

3.   Remove the front panel assembly, then set aside.
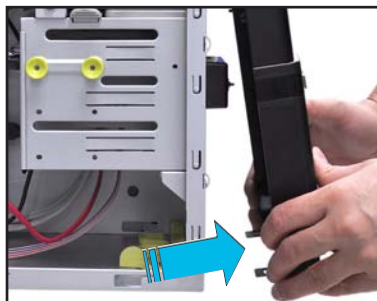
2.6.2   Installing 5.25-inch drives

To install 5.25-inch drives

1.   Select the drive bay you intend to use and remove the drive slot plate cover.

2.   Release the bay locks.
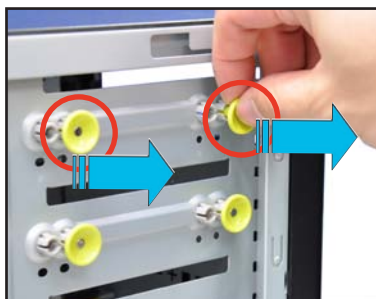
3.   Insert the drive into the 5.25-inch drive bay and carefully push the drive into the bay until its screw holes align with the holes on the bay.

4.   Push in the bay locks to secure the optical drive
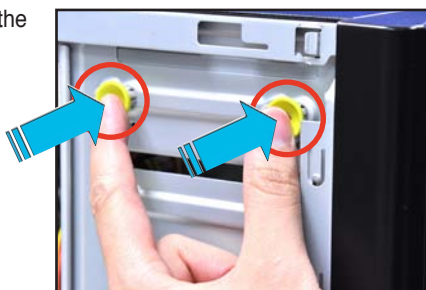
5.	Connect a 7-pin SATA cable (from the motherboard SATA port) and a 15-pin power plug (from the power supply unit) to the back connectors of the hard disk drive.

6.	Reinstall the front panel cover and side covers when done.
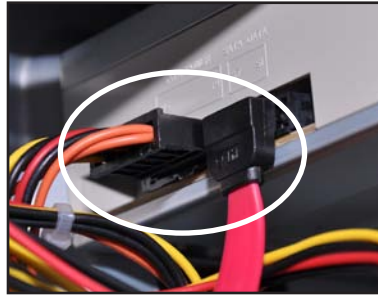
Use either the 15-pin SATA power connector OR the legacy 4-pin power connector. DO NOT use both to prevent damage to components and to keep the system from becoming unstable.

2.7 Expansion slots

Ensure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.
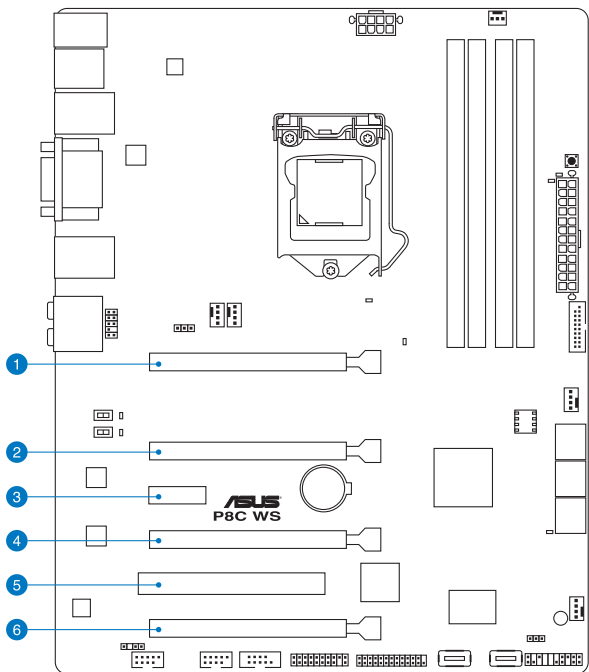
Slot No.	Slot Description
1	PCIe 3.0 x16_1 slot (single at x16 or dual at x8/x8 mode)
2	PCIe 3.0 x16_2 slot (x8 mode)
3	PCIe 2.0 x1_1 slot
4	PCIe 2.0 x16_3 slot (x4 mode)
5	PCI1 slot
6	PCIe 2.0 x16_4 slot (x4 mode)

2.7.2   Installing expansion cards

⚠️ Ensure to unplug the power cable before installing or removing an expansion card. Failure to do so may cause severe damage to the motherboard and other system components!

To install an expansion card

1.   Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.

2.   Remove the left side cover from the chassis.

3.   Lay the system on its side on a flat, stable surface.

4.   Select the slot that you intend to use, and then remove the metal bracket next to the slot.

5.   Align the card golden fingers to the slot and its metal bracket to the slot opening on the chassis.

6.   Press the card firmly until it is properly seated on the slot.
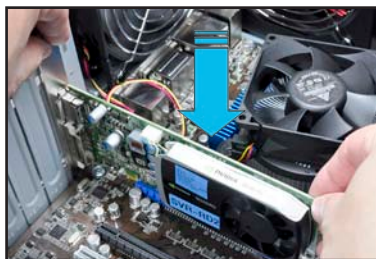
7.   Secure the card to the chassis with the bracket screw you removed earlier.

2.7.3   Configuring an expansion card

After installing the expansion card, configure it by adjusting the software settings.

1.   Turn on the system and change the necessary BIOS settings, if any. See Chapter 4 for information on BIOS setup.
2.   Assign an IRQ to the card. Refer to the tables on the next page.
3.   Install the software drivers for the expansion card.

> •   When using PCI cards on shared slots, ensure that the drivers support "Share IRQ" or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable. Refer to the table on the next page for details.
>
> •   By default, if you install a discrete graphics card on the PCIe x16 slot, the onboard GPU will be automatically disabled. Connect the VGA cable to the discrete graphics card first when using a discrete graphics card.

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
4	12	Communications Port (COM1)
5	13	IRQ Holder for PCI Steering
6	14	Reserved
7	15	Reserved
8	3	System CMOS/Real Time Clock
9	4	IRQ Holder for PCI Steering
10	5	IRQ Holder for PCI Steering
11	6	IRQ Holder for PCI Steering
12	7	Reserved
13	8	Numeric Data Processor
14	9	Primary IDE Channel

IRQ assignments for this motherboard

	A	B	C	D	E	F	G	H
PCIEx16_1	shared	–	–	–	–	–	–	–
PCIEx16_2		shared	–	–	–	–	–	–
PCIEx16_3	–	–	–	shared	–	–	–	–
PCIEx16_4	shared	–	–	–	–	–	–	–
PCIEx1_1	shared	–	–	–	–	–	–	–
PCI1	shared	–	–	–	–	–	–	–
VIA1394	–	–	–	shared	–	–	–	–
USB3.0	shared	–	–	–	–	–	–	–
LAN1 (82574)	–	shared	–	–	–	–	–	–
LAN2 (82574)	–	–	shared	–	–	–	–	–
SATA Controller 1	–	–	–	shared	–	–	–	–
SATA Controller 2	–	–	–	shared	–	–	–	–
USB 2.0 Controller 1	–	–	–	–	–	–	–	shared
USB 2.0 Controller 2	shared	–	–	–	–	–	–	–
HD Audio	–	–	–	–	–	–	shared	–

2.8   Removing the system fan

You may need to remove previously installed system components when installing or removing other system components, or when replacing a defective component. This section tells how to remove the system fan.

To remove the system fan:

1.   Disconnect the chassis fan cable from the **CHA_FAN1** connector on the motherboard.

P8C WS Fan connectors
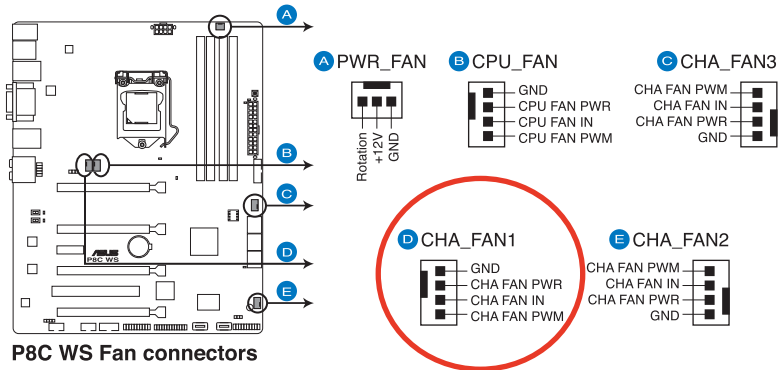
2.   Locate and remove four system fan screws at the rear panel. Keep the screws for later use.

Hold the system fan with one hand while removing the system screws.
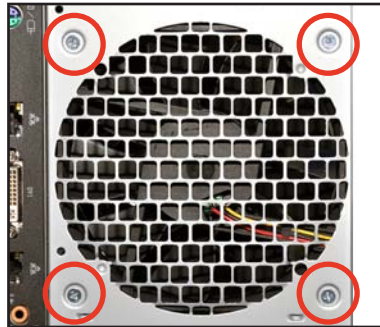
3.   Remove the system fan, and then set aside.

2.9 Connecting cables

The ESC500 G2 chassis includes the power and signal cables that you need to connect to the motherboard, storage drives, and other devices that you intend to install.

> • The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you will remove pre-installed components to install additional devices.
>
> • Refer to Chapter 3 for detailed information on the connectors.

Standard cables connected to the motherboard

1. 24-pin EATX power plug
2. 8-pin EATX 12V power plug
3. Front panel USB 2.0 cable
4. Front panel USB 3.0 cable
5. Front panel audio module cable
6. System fan cable
7. CPU fan cable
8. System panel cable
9. Card reader cable

This chapter gives information about the motherboard that comes with the workstation. This chapter includes the motherboard layout, jumper settings, and connector locations.

Motherboard info

ASUS ESC500 G2

3.1 Motherboard layouts

P8C WS Motherboard

KB_USB910

F_USB78

EPU

LAN2_USB56

ASM1442

SPDIF_O1
SPDIF_O2
DVI

LAN1_USB3_34

AUDIO

CHAFAN_SEL

CHA_FAN1

CPU_FAN

AAFP

EPU

GPU Boost

O2LED1

O2LED2

Intel®
82574L

Intel®
82574L

ALC892

PCIEX16_1

PCIEX16_2

PCIEX1_1

PCIEX16_3

PCI1

PCIEX16_4

SPDIF_OUT

IE1394_2

USB1314

COM1

TPM

LPT1

USB12

USB11

PANEL

LGA1155

EATX12V

PWR_FAN

DDR3 DIMM_A1 (64bit, 240-pin module)

DDR3 DIMM_A2 (64bit, 240-pin module)

DDR3 DIMM_B1 (64bit, 240-pin module)

DDR3 DIMM_B2 (64bit, 240-pin module)

DIAG_DRAM

DRAM_LED

MemOK!

DIAG_CPU

DIAG_VGA

EATXPWR

USB3L_12

CHA_FAN3

SATA6G_1
SATA6G_2

SATA3G_3
SATA3G_4

SATA3G_5
SATA3G_6

BIOS

C216

DIAG_HDD

VIA
VT6308S

Super
I/O

CHA_FAN2

SB_PWR

CLRTC

Lithium Cell
CMOS Power

P8C WS

Refer to **3.5 Connectors** for more information about internal connectors and rear panel connectors.

Layout contents

Connectors/Jumpers/Switches/Slots	Page
1. LGA1155 CPU Socket	2-5
2. Power connectors (24-pin EATXPWR, 8-pin EATX12V)	3-21
3. DDR3 DIMM slots	2-11
4. CPU, chassis, and power fan connectors (4-pin CPU_FAN, 4-pin CHA_FAN1-3, 3-pin PWR_FAN)	3-17
5. MemOK! switch	3-6
6. USB 3.0 connector (20-1 pin USB3_12)	3-15
7. Intel® C216 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1-2 [gray])	3-12
8. Intel® C216 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_3–6 [blue])	3-13
9. Onboard LED	3-7
10. System panel connector (20-8 pin PANEL)	3-22
11. Clear RTC RAM (3-pin CLRTC)	3-10
12. USB 2.0 connectors (Type A: 10-1 pin USB1314; Type B: USB11/ USB12)	3-14
13. Parallel port connector (26-1 pin LPT1)	3-15
14. TPM connector (20-1 pin TPM)	3-19
15. Serial port connector (10-1 pin COM1)	3-18
16. Digital audio connector (4-1 pin SPDIF_OUT)	3-16
17. IEEE 1394a port connector (10-1 pin IE1394_2)	3-16
18. GPU Boost Switch	3-5
19. EPU Switch	3-4
20. Chassis Fan control setting (3-pin CHAFAN_SEL)	3-11
21. Front panel audio connector (10-1 pin AAFP)	3-18

3.2 Onboard buttons and switches

Onboard buttons and switches enhance overclocking and gaming performance when working on a bare or open-case system.

1. **EPU switch**

   Turning this switch to **Enable** will automatically detect the current PC loadings and intelligently moderate the power consumption.

   For ensuring the system performance, turn the switch setting to **Enable** when the system is powered off.

EPU

Disable (Default)   Enable

P8C WS EPU switch
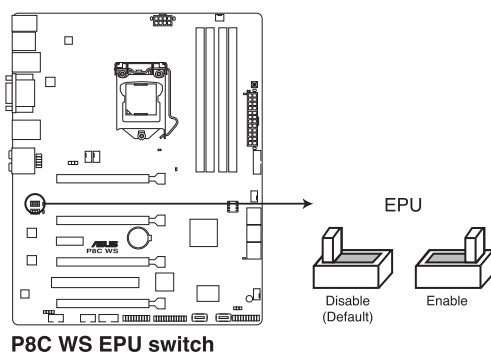
2. **GPU Boost switch**

Turning this switch to **Enable** will automatically optimize the system for fast, yet stable GPU speed.

> For ensuring the system performance, turn the switch setting to **Enable** when the system is powered off.

GPU Boost

Disable (Default)　　Enable
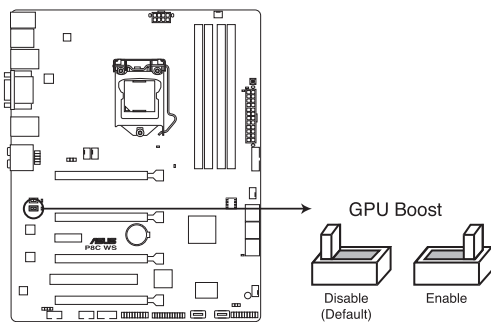
P8C WS GPU Boost switch

> The GPU Boost Switch functions only when you install the DESKTOP CPU that supports onboard graphics.

3. **MemOK! button**

When you install DIMMs that are not compatible with the motherboard, this may cause the system boot failure, and the DRAM_LED near the MemOK switch lights continuously. Simply press the MemOK button until the DRAM_LED starts blinking to patch memory compatibility issues and ensure the system's successful bootup.
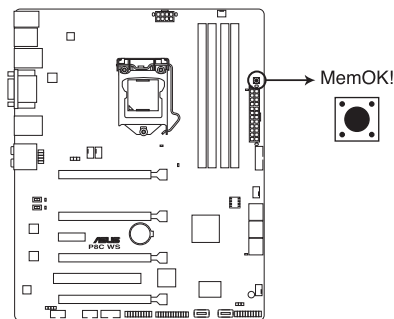
MemOK!

P8C WS MemOK! switch

- Refer to section **3.3 Onboard LEDs** for the exact location of the DRAM_LED.

- The DRAM_LED also lights when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.

- The MemOK! button does not function under Windows™ OS environment.

- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and test the next set of failsafe settings. The blinking speed of the DRAM_LED increases, indicating different test processes.

- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. If the installed DIMMs still fail to boot after the whole tuning process, the DRAM_LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) in this user manual or on the ASUS website at www.asus.com.

- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.

- If your system fails to boot up due to BIOS overclocking, press the MemOK! button to boot and load the BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.

- We recommend that you download and update to the latest BIOS version from the ASUS website at www.asus.com after using the MemOK! function.

3.3   Onboard LEDs

1.   POST State LEDs

The POST State LEDs indicate the status of these key components during POST (Power-on-Self Test): CPU, memory modules, VGA card, and hard disk drive. If an error is found, the critical component's LED stays lit up until the problem is solved.

DIAG_DRAM

DIAG_CPU
DIAG_VGA

DIAG_HDD
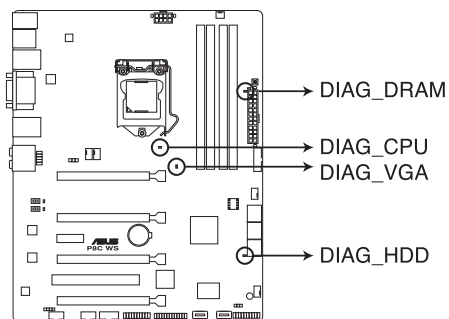
P8C WS DIAG_DRAM/ CPU/ VGA/ HDD LED

2.   GPU Boost LED

The GPU Boost LED lights up when the GPU Boost switch is turned to **Enable**.

O2LED1
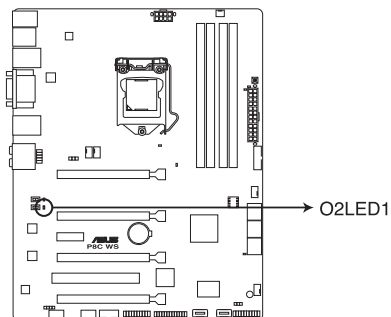
P8C WS GPU Boost LED

3.   **EPU LED**

The EPU LED lights up when the EPU switch is turned to **Enable**.

O2LED2
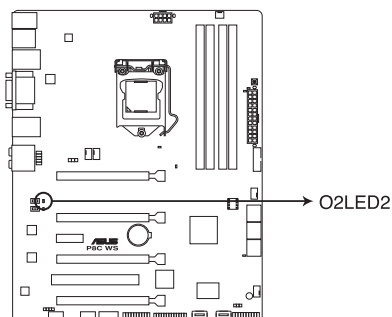
P8C WS EPU LED

4.   **Standby power LED**

The motherboard comes with a standby power LED that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LED.

SB_PWR

ON   OFF
Standby Power   Powered Off
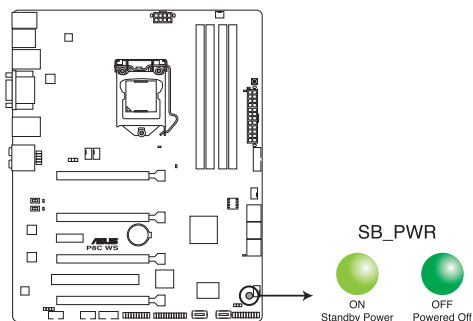
P8C WS Onboard LED

5. **DRAM LED**

   The DRAM_LED lights up when the installed DIMMs incompatible with the motherboard or improperly installed. When using the MemOK! switch for automatic memory compatibility tuning, the DRAM_LED will blink.
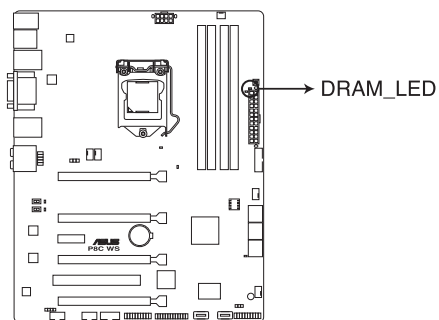
DRAM_LED

P8C WS DRAM LED

3.4   Jumpers

1.   **Clear RTC RAM (3-pin CLRTC)**

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

To erase the RTC RAM

1.   Turn OFF the computer and unplug the power cord.

2.   Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5–10 seconds, then move the cap back to pins 1-2.

3.   Plug the power cord and turn ON the computer.

4.   Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

CLRTC

1 2   2 3

Normal   Clear RTC
(Default)

P8C WS Clear RTC RAM
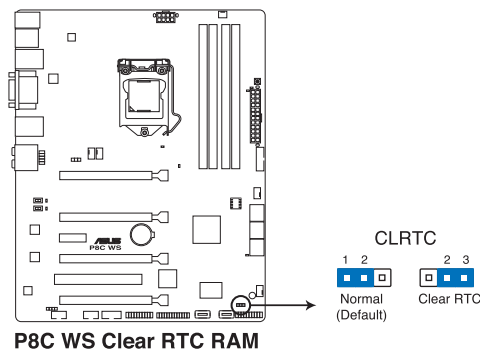
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!

•   If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.

•   You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the C.P.R. (CPU Parameter Recall) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.

•   Due to the chipset behavior, AC power off is required to enable C.P.R. function. You must turn off and on the power supply or unplug and plug the power cord before rebooting the system.

2. **Chassis Fan control setting (3-pin CHAFAN_SEL)**

These jumpers allow you to switch for fan pin selection. The CHAFAN_SEL jumper is for the front fans and rear fans control. Set to pins 1–2 when using 3-pin fans or pins 2–3 when using 4-pin fans.

P8C WS CHAFAN setting
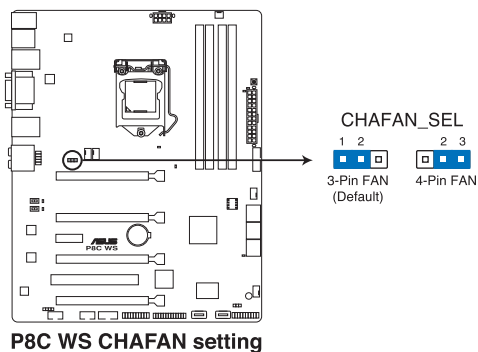
- If you use a 4-pin fan but set the jumper to pin 1-2, the fan you installed may not work.
- If you use a 3-pin fan but set the jumper for a 4-pin fan, the fan control will not work and the fan you installed will always run at full speed.

3.5 Internal connectors

1. **Intel® C216 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1-2 [gray])**

These connectors connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.
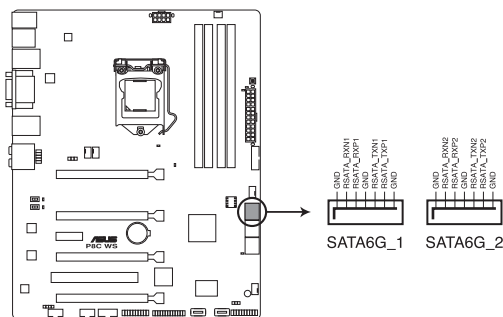
P8C WS Intel® SATA 6.0 Gb/s connectors
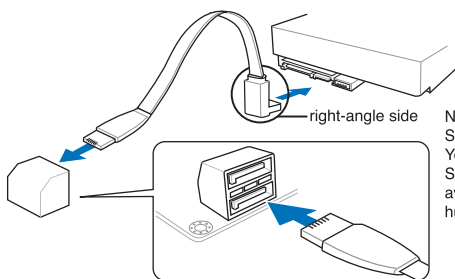
right-angle side

NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.

- These connectors are set to [AHCI Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the **SATA Mode** item in the BIOS to [RAID Mode]. Refer to section **4.5.4 SATA Configuration** for details.

- Before creating a RAID set, refer to section **5.5 RAID configurations** or the manual bundled in the motherboard support DVD.

- When using NCQ, set the **SATA Mode** in the BIOS to [AHCI Mode]. Refer to section **4.5.4 SATA Configuration** for details.

- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

2. Intel® C216 Serial ATA 3.0 Gb/s connectors
(7-pin SATA3G_3–6 [blue])

These connectors connect to Serial ATA 3.0 Gb/s hard disk drives and optical disc drives via Serial ATA 3.0 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® C216 chipset.
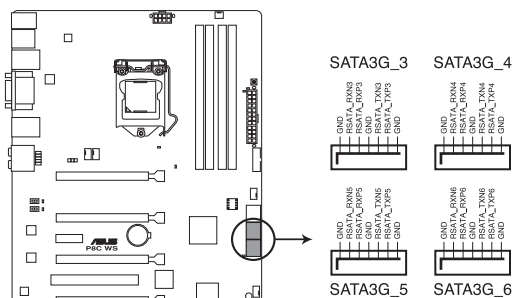
P8C WS Intel® SATA 3.0 Gb/s connectors

- These connectors are set to [AHCI Mode] by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to [RAID Mode]. Refer to section 3.5.4 SATA Configuration for details.

- Before creating a RAID set, refer to section **5.5 RAID configurations** or the manual bundled in the motherboard support DVD.

- When using hot-plug and NCQ, set the SATA Mode in the BIOS to [AHCI Mode]. Refer to section **4.5.4 SATA Configuration** for details.

- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

3.   **USB 2.0 connectors**
      (Type A: 10-1 pin USB1314; Type B: USB11/ USB12)

      These connectors are for USB 2.0 ports. Connect the USB module cable
      to any of these connectors, then install the module to a slot opening at the
      back of the system chassis. These USB connectors comply with USB 2.0
      specification that supports up to 480 Mbps connection speed.

P8C WS USB2.0 connectors
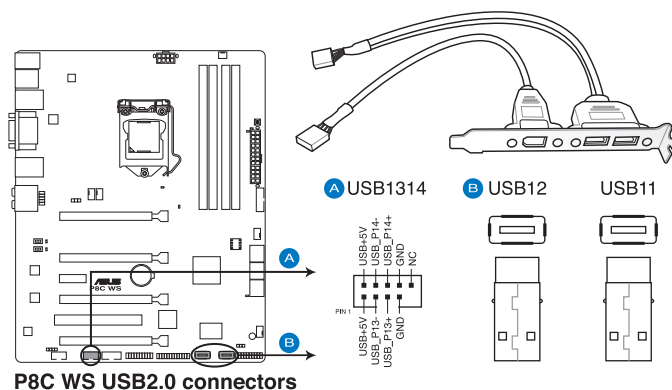
⚠	Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

✎	You can connect the front panel USB cable to the ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.

4. USB 3.0 connector (20-1 pin USB3_12)

This connector is for the additional USB 3.0 ports, and complies with the USB 3.0 specificaton that supports up to 5Gbps connection speed. If the USB 3.0 front panel cable is available from your system chassis, with this USB 3.0 connector, you can have a front panel USB 3.0 solution.

USB3_12

PIN 1

	VBus
VBus	StdA_P1_SSRX-
StdA_P2_SSRX-	StdA_P1_SSRX+
StdA_P2_SSRX+	GND
GND	StdA_P1_SSTX-
StdA_P2_SSTX-	StdA_P1_SSTX+
StdA_P2_SSTX+	GND
GND	StdA_P1_D-
StdA_P2_D-	StdA_P1_D+
StdA_P2_D+	ID

P8C WS USB3.0 connector
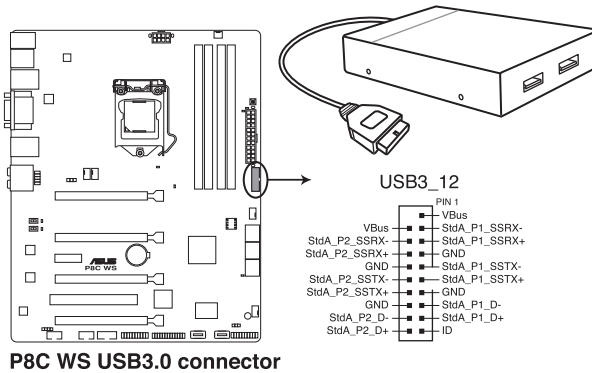
- You can connect the ASUS front panel USB 3.0 box to this connector to obtain the front panel USB 3.0 solution.
- Due to Intel® limitations, the USB3_12 only supports Windows® 7 operating system.

5. Parallel port connector (26-1 pin LPT1)

This connector is for a parallel port. Connect the parallel port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

LPT1

PIN1

AFD# ERROR# PINIT# SLIN# GND GND GND GND GND GND GND

STB# SPD0 SPD1 SPD2 SPD3 SPD4 SPD5 SPD6 SPD7 ACK# BUSY PE SLCT

P8C WS Parallel port connector
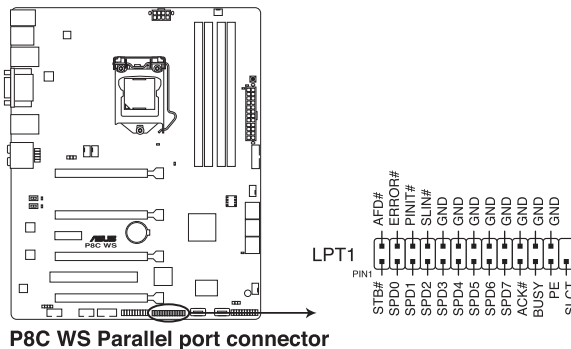
6. IEEE 1394a port connector (10-1 pin IE1394_2)

This connector is for an IEEE 1394a port. Connect the IEEE 1394a module cable to this connector, then install the module to a slot opening at the back of the system chassis.

IE1394_2

P8C WS IEEE 1394 connector

TPA2-
GND
TPB2-
+12V
GND

PIN 1

TPA2+
GND
TPB2+
+12V
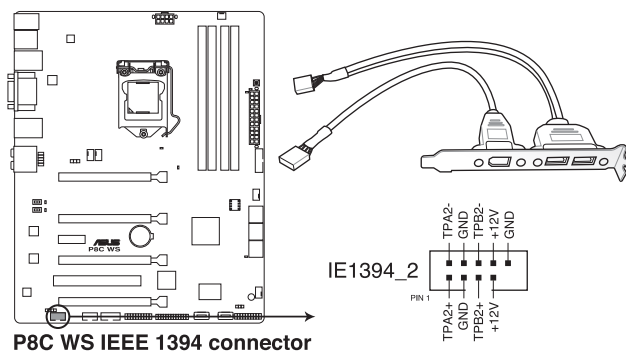
Never connect a USB cable to the IEEE 1394a connector. Doing so will damage the motherboard!

The IEEE 1394a module is purchased separately.

7. Digital audio connector (4-1 pin SPDIF_OUT)

This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port. Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.

SPDIF_OUT

P8C WS Digital audio connector

+5V
SPDIFOUT
GND
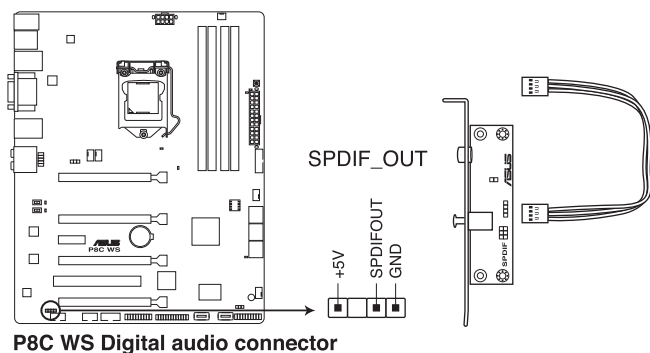
The S/PDIF module is purchased separately.

8. CPU, chassis, and power fan connectors
   (4-pin CPU_FAN, 4-pin CHA_FAN1-3, 3-pin PWR_FAN)

Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.
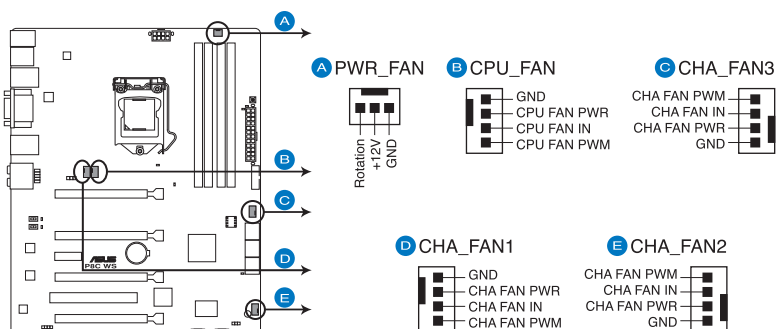
P8C WS Fan connectors

Do not forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!

- The CPU_FAN connector supports the CPU fan of maximum 2A (24 W) fan power.
- If you install two VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN1, CHA_FAN2, CHA_FAN3 for better thermal environment.

9. **Front panel audio connector (10-1 pin AAFP)**

This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC`97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.

AAFP

PIN 1

PORT1L — GND
PORT1R — PRESENCE#
PORT2R — SENSE1_RETUR
SENSE_SEND —
PORT2L — SENSE2_RETUR

HD-audio-compliant
pin definition

PIN 1

MIC2 — AGND
MICPWR — NC
Line out_R — NC
NC —
Line out_L — NC

Legacy AC'97
compliant definition
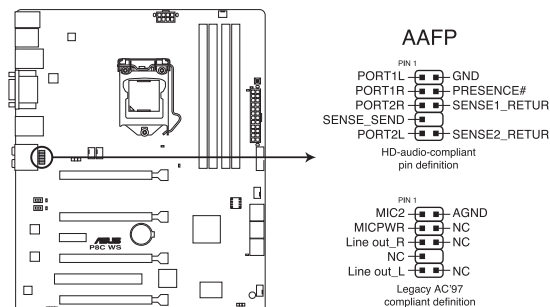
P8C WS Analog front panel connector

> • We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.
>
> • If you want to connect a high-definition front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to [HD]; if you want to connect an AC'97 front panel audio module to this connector, set the item to [AC97]. By default, this connector is set to [HD].

10. **Serial port connector (10-1 pin COM1)**

This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

PIN 1   COM1
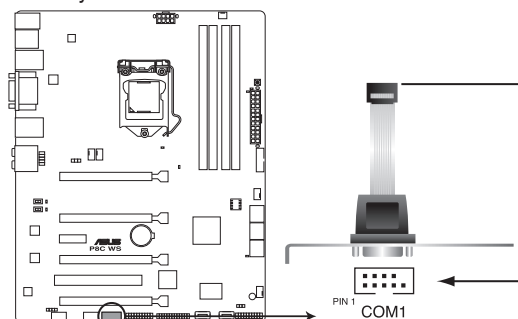
P8C WS Serial port (COM1) connector

> The COM module is purchased separately.

11. TPM connector (20-1 pin TPM)

This connector supports a Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity. This connector can also serve for G.P. Diagnosis card installtion.

P8C WS TPM connector
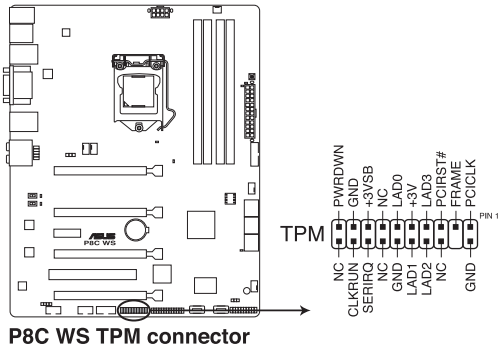
G.P. Diagnosis card layout

LED 0 and 1

Power Switch. Press to turn ON or OFF the motherboard.

Reset Button. Press to restart the motherboard.
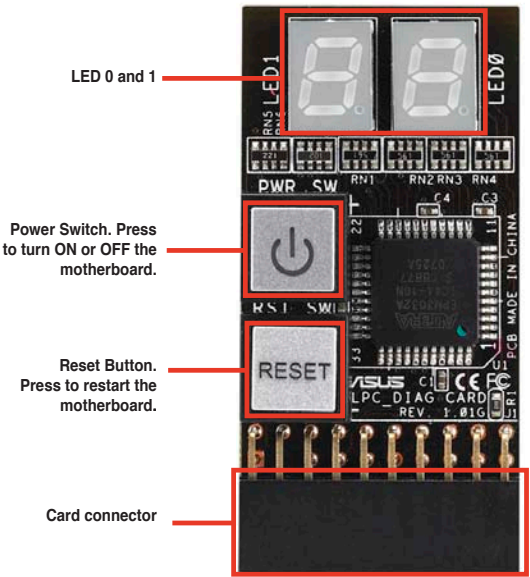
Card connector

Installing G.P. Diagnosis card

⚠️ Ensure to turn off the power supply unit before installing the diagnosis card to avoid electrical shock hazard.

1. Locate the **TPM connector (20-1 pin TPM)** on the motherboard.

2. With the LEDs of the diagnosis card facing to the PCIe slots, align the card connector with the TPM connector and press firmly until the card sits on the connector completely.
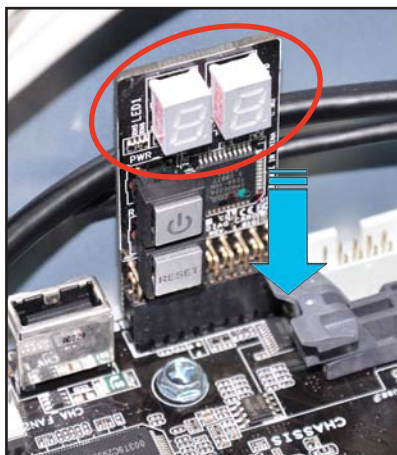
Code table for G.P. Diagnosis card

15, 19	Initiate chip	AC	OS in PIC mode
E0	Check and wake up system	AA	OS in APIC mode
2B-2F	Prepare system for memory detection and sizing	00	Leave BIOS and pass control to OS
32	Early CPU initiation	01	S1
34	Wake up AP	03	S3
98	Detect PS2 mouse/keyboard	04	S4
97	Initiate VGA BIOS	05	S5
9A-9D	USB initiation	10	Resume from S1
A2	Detect IDE	30	Resume from S3
B2	Initiate option ROM	40	Resume from S4

**12. ATX power connectors
(24-pin EATXPWR, 8-pin EATX12V)**

These connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

EATX12V

+12V DC
+12V DC
+12V DC
+12V DC
GND
GND
GND
GND
PIN 1

EATXPWR

+3 Volts — GND
+12 Volts — +5 Volts
+12 Volts — +5 Volts
+5V Standby — +5 Volts
Power OK — NC
GND — GND
+5 Volts — GND
GND — GND
+5 Volts — PSON#
GND — GND
+3 Volts — -12 Volts
+3 Volts — +3 Volts
PIN 1
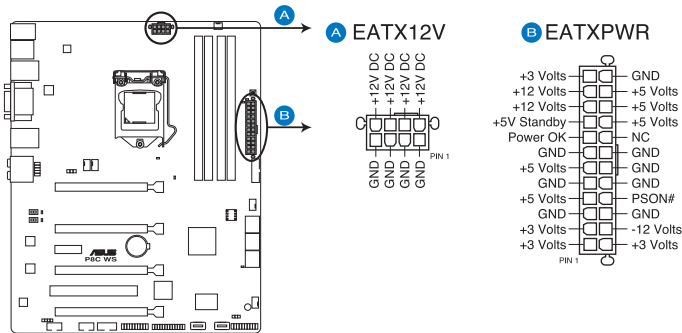
P8C WS ATX power connectors

- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 350 W.

- Do not forget to connect the 8-pin EATX12 V power plug; otherwise, the system will not boot.

- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.

- If you are uncertain about the minimum power supply requirement for your system, refer to the Recommended Power Supply Wattage Calculator at **http://support.asus.com/PowerSupplyCalculator/PSCalculator. aspx?SLanguage=en-us** for details.

- If you want to use two or more high-end PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.

13. System panel connector (20-8 pin PANEL)

This connector supports several chassis-mounted functions.
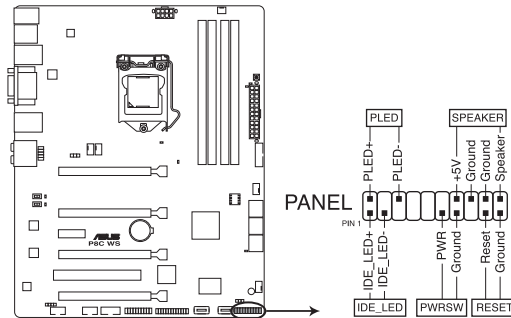
P8C WS System panel connector

- **System power LED (2-pin PLED)**

  This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Hard disk drive activity LED (2-pin IDE_LED)**

  This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

- **System warning speaker (4-pin SPEAKER)**

  This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

- **ATX power button/soft-off button (2-pin PWRSW)**

  This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **Reset button (2-pin RESET)**

  This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

3.5.1   Rear panel connection
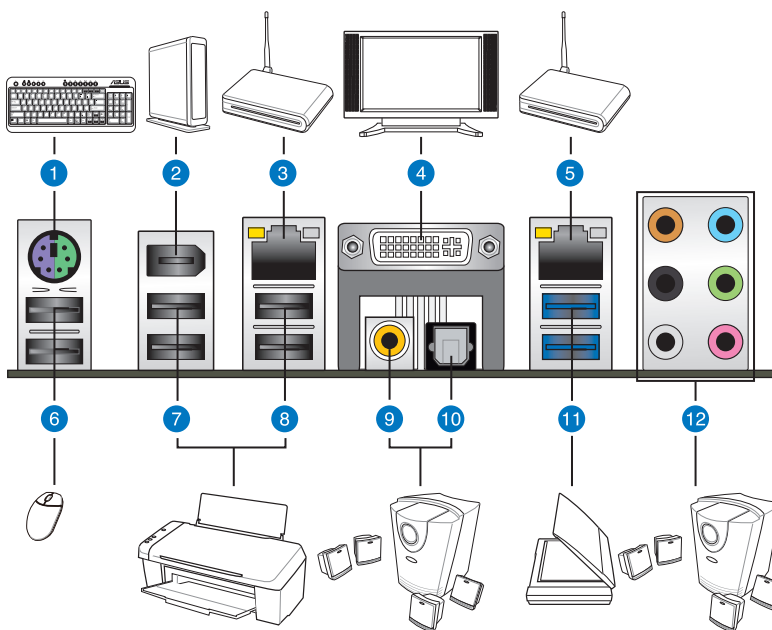
Rear panel connectors	
1. PS/2 mouse and keyboard port	7. USB 2.0 ports 7 and 8
2. IEEE 1394a port	8. USB 2.0 ports 5 and 6
3. LAN (RJ-45) port 2*	9. Coaxial S/PDIF Out port
4. DVI port	10. Optical S/PDIF Out port
5. LAN (RJ-45) port 1*	11. USB 3.0 ports 3 and 4
6. USB 2.0 ports 9 and 10	12. Audio I/O ports**

*and **: Refer to the tables on the next page for LAN port and audio port definitions.

- • Due to USB 3.0 controller limitation, USB 3.0 devices can only be used under Windows® OS environment and after the USB 3.0 driver installation.

- • USB 3.0 devices can only be used as data storage only.

- • We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.

* LAN port LED indications

Activity Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

ACT/LINK
LED

SPEED
LED

LAN port
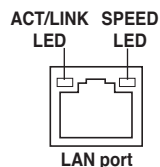
**Audio 2, 4, 6, or 8-channel configuration

Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Subwoofer	Center/Subwoofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out
Gray	–	–	–	Side Speaker Out

3.5.2   Audio I/O connections

Audio I/O ports

orange

black

gray

light blue

lime

pink
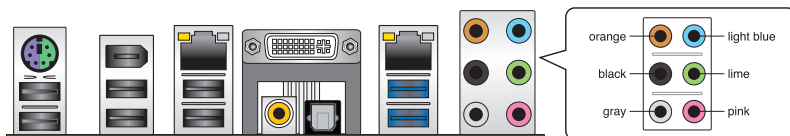
Connect to Headphone and Mic

Connect to Stereo Speakers
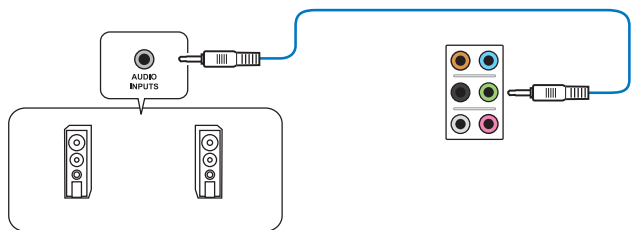
Connect to 2.1 channel Speakers
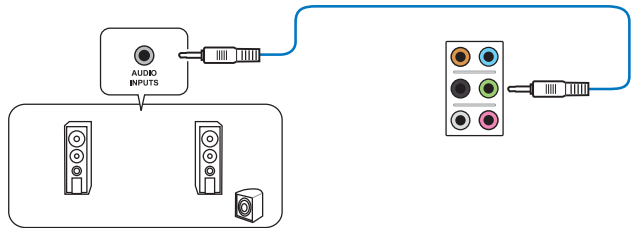
Connect to 4.1 channel Speakers
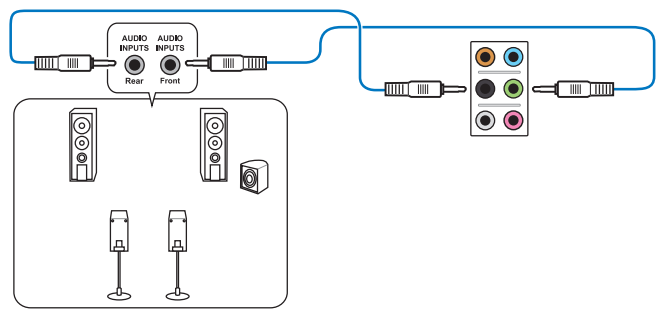
Connect to 5.1 channel Speakers
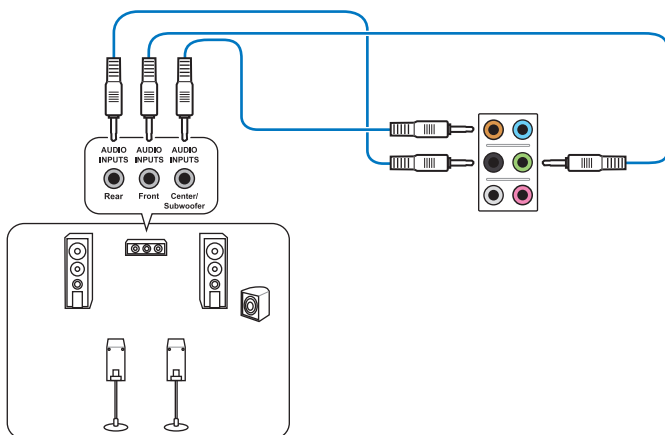
Connect to 7.1 channel Speakers
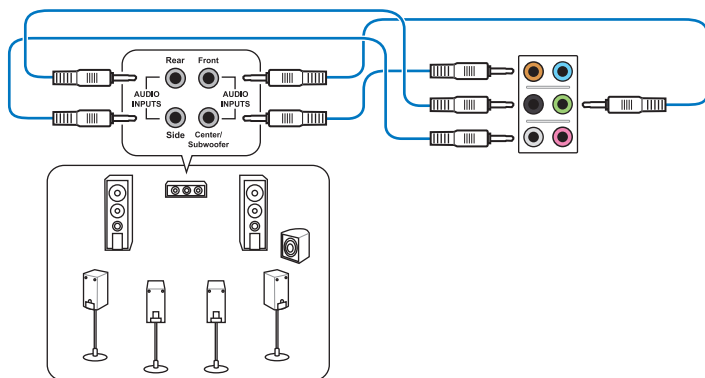
This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

BIOS information

4.1 Knowing BIOS

The new ASUS UEFI BIOS is a Unified Extensible Interface that complies with UEFI architecture, offering a user-friendly interface that goes beyond the traditional keyboard-only BIOS controls to enable a more flexible and convenient mouse input. Users can easily navigate the new UEFI BIOS with the same smoothness as their operating system. The term "BIOS" in this user manual refers to "UEFI BIOS" unless otherwise specified.

BIOS (Basic Input and Output System) stores system hardware settings such as storage device configuration, overclocking settings, advanced power management, and boot device configuration that are needed for system startup in the motherboard CMOS. In normal circumstances, the default BIOS settings apply to most conditions to ensure optimum performance. **We recommend that you not change the default BIOS settings** except in the following circumstances:

• An error message appears on the screen during the system bootup and requests you to run the BIOS Setup.

• You have installed a new system component that requires further BIOS settings or update.

Inappropriate settings of the BIOS may result to instability or failure to boot. **We strongly recommend that you change the BIOS settings only with the help of a trained service personnel**.

4.2 BIOS setup program

A BIOS setup program is provided for BIOS item modification. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility. Otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, press <Ctrl> + <Alt> + <Delete>, or press the reset button on the system chassis to restart the system. You can also turn the system off and then turn it back on to restart the system. Do this last option only if the first two failed.

> • The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
>
> • Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
>
> • If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu. See section **4.9 Exit Menu** for details.
>
> • If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section **2.2.5 Onboard switches** for information on how to erase the RTC RAM.
>
> • The BIOS setup program does not support the bluetooth devices.

The BIOS setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various submenus and select from the available options using a keyboard or a USB mouse.

The BIOS setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from the **Exit** menu or from the **Exit/Advanced Mode** button in the **EZ Mode/Advanced Mode** screen.

4.2.1 EZ Mode

By default, the EZ Mode screen appears when you enter the BIOS setup program. The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance mode and boot device priority. To access the Advanced Mode, click **Exit/Advanced Mode**, then select **Advanced Mode** or press F7 hot key for the advanced BIOS settings.

The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in **section 4.7 Boot memu** for details.

Selects the display language of the BIOS setup program

Clicks to display all fan speeds if available

Displays the CPU/motherboard temperature, CPU/5V/3.3V/12V voltage output, CPU/chassis/power fan speed

Exits the BIOS setup program without saving the changes, saves the changes and resets the system, or enters the Advanced Mode

Displays the Advanced mode menus

Selects the boot device priority

Selects the Advanced mode functions

Power Saving mode

Normal mode

Displays the system properties of the selected mode on the right hand side

Loads optimized default

ASUS Optimal mode

Selects the boot device priority

• The boot device options vary depending on the devices you installed to the system.

• The **Boot Menu(F8)** button is available only when the boot device is installed to the system.

4.2.2 Advanced Mode

The Advanced Mode provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the Advanced Mode. Refer to the following sections for the detailed configurations.

To access the EZ Mode, click **Exit**, then select **ASUS EZ Mode**.

Menu items   Menu bar   Configuration fields   General help

Submenu item   Pop-up window   Scroll bar   Navigation keys
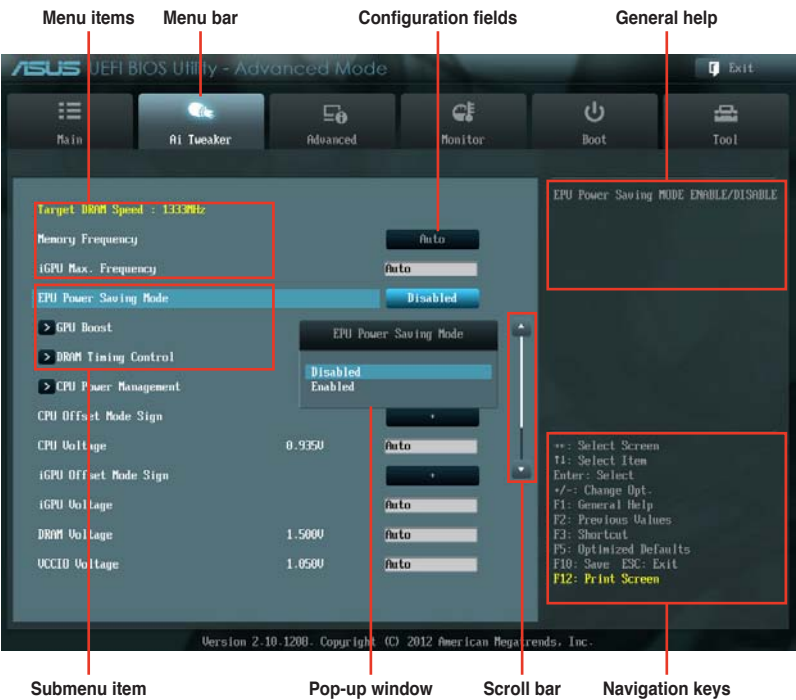
Menu bar

The menu bar on top of the screen has the following main items:

Main	For changing the basic system configuration
Ai Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Monitor	For displaying the system temperature, power status, and changing the fan settings.
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Exit	For selecting the exit options and loading default settings

Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

Back button

This button appears when entering a submenu. Press <Esc> or use the USB mouse to click this button to return to the previous menu screen.

Submenu items

A greater than sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

Pop-up window

Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

Navigation keys

At the bottom right corner of the menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

General help

At the top right corner of the menu screen is a brief description of the selected item. Use <F12> key to capture the BIOS screen and save it to the removable storage device.

Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not
user-configurable.

A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

4.3 Main menu

The Main menu screen appears when you enter the Advanced Mode of the BIOS Setup program. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.

4.3.1 System Language [English]

Allows you to choose the BIOS language version from the options. Configuration options:

[English] [Français] [Español] [Deutsch] [Русский] [日本語] [繁體中文] [简体中文]

4.3.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

4.3.3 System Time [xx:xx:xx]

Allows you to set the system time.

4.3.4 Security
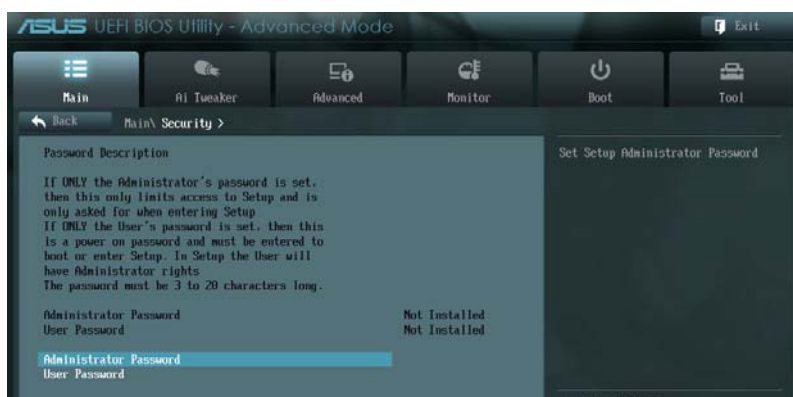
> • If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section **2.3.5 Onboard switches** for information on how to erase the RTC RAM.
>
> • The **Administrator** or **User Password** items on top of the screen show the default **Not Installed**. After you set a password, these items show **Installed**.

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

To set an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **Administrator Password** item on top of the screen shows **Not Installed**.

User Password

If you have set a user password, you must enter the user password for accessing the system. The **User Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows **Installed**.

To set a user password:

1.   Select the **User Password** item and press <Enter>.
2.   From the **Create New Password** box, key in a password, then press <Enter>.
3.   Confirm the password when prompted.

To change a user password:

1.   Select the **User Password** item and press <Enter>.
2.   From the **Enter Current Password** box, key in the current password, then press <Enter>.
3.   From the **Create New Password** box, key in a new password, then press <Enter>.
4.   Confirm the password when prompted.

To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **User Password** item on top of the screen shows **Not Installed**.

4.4 Ai Tweaker menu

The Ai Tweaker menu items allow you to configure overclocking-related items.

Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.

The configuration options for this section vary depending on the CPU and DIMM model you installed on the motherboard.

Scroll down to display the following items:

Ai Overclock Tuner [Auto]

Allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Select any of these preset overclocking configuration options:

[Auto]   Loads the optimal settings for the system.

[X.M.P.]   If you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profiles supported by your memory modules for optimizing the system performance.

> The item X.M.P. appears only when you set the Ai Overclocking Tuner to [Manual].

Memory Frequency [Auto]

Allows you to set the memory operating frequency. The configuration options vary with the **BCLK/PEG Frequency** item settings.
Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz] [DDR3-1333MHz] [DDR3-1400MHz] [DDR3-1600MHz]

> Selecting a very high memory frequency may cause the system to become unstable! If this happens, revert to the default setting.

iGPU Max. Frequency [Auto]

Use the <+> and <-> keys to adjust the value. The minimum frequency vary depending on the type of CPU installed.
Configuration options: [Auto] [depending on CPU] [3000MHz]*

*only for desktop processors

EPU Power Saving Mode [Disabled]

Allows you to enable or disable the EPU power saving function.
Configuration options: [Disabled] [Enabled]

GPU Boost

GPU Boost accelerates the integrated GPU for extreme graphics performance.
Configuration options: [Ok] [Cancel]

DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

> Changing the values in this menu may cause the system to become unstable! If this **happens, revert to the default settings.**

Primary Timings

 DRAM CAS# Latency [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# to CAS# Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# PRE Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# ACT Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [40 DRAM Clock]

DRAM COMMAND Mode [Auto]
Configuration options: [Auto] [1 DRAM Clock] [2 DRAM Clock] [3 DRAM Clock]

Secondary Timings

DRAM RAS# to RAS# Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM REF Cycle Time [Auto]
Configuration options: [Auto] [48 DRAM Clock] – [511 DRAM Clock]

DRAM Refresh Interval [Auto]
Configuration options: [Auto] [3120 DRAM Clock] – [9999 DRAM Clock]

DRAM WRITE Recovery Time [Auto]
Configuration options: [Auto] [5 DRAM Clock] – [16 DRAM Clock]

DRAM READ to PRE Time [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [15 DRAM Clock]

DRAM FOUR ACT WIN Time [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

DRAM WRITE to READ Delay [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [8 DRAM Clock]

DRAM CKE Minimum pulse width [Auto]
Configuration options: [Auto] [3 DRAM Clock] – [15 DRAM Clock]

DRAM CAS# Write Latency [Auto]
Configuration options: [Auto] [5 DRAM Clock] – [15 DRAM Clock]

DRAM RTL (CHA) [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

DRAM RTL (CHB) [Auto]
Configuration options: [Auto] [16 DRAM Clock] – [63 DRAM Clock]

Third Timings

tWRDR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRWDR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRWSR [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRR (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRR (DR) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tRRSR [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

tWW (DD) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tWW (DR) [Auto]
Configuration options: [Auto] [1 DRAM Clock] – [6 DRAM Clock]

tWWSR [Auto]
Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

CPU Power Management

The sub-items in this menu allow you to set the CPU ratio and features.

CPU Ratio [Auto]
Allows you to manually adjust the maximum non-turbo CPU ratio. Use <+> and <-> keys to adjust the value. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]
Allows you to enable or disable the Enhanced Intel® SpeedStep Technology.

[Disabled] Disables this function.

[Enabled] The operating system dynamically adjusts the processor voltage and core frequency which may result in decreased average consumption and decreased average heat production.

Turbo Mode [Enabled]
This item appears only when you set the **Enhanced Intel SpeedStep Technology** item to [Enabled].

[Disabled] Disables this function.

[Enabled] Allows processor cores to run faster than marked frequency in specific condition.

> The following five items appear only when you set the **Enhanced Intel SpeedStep Technology** and **Turbo Mode** items to [Enabled].

Long Duration Power Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Long Duration Maintained [Auto]
Use the <+> and <-> keys to adjust the value.

Short Duration Power Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Primary Plane Current Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Secondary Plane Current Limit [Auto]
Use the <+> and <-> keys to adjust the value.

Some of the following items are adjusted by typing the desired values using the numeric keypad and press the <Enter> key. You can also use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

CPU Offset Mode Sign [+]

[+]   To offset the voltage by a positive value.

[–]   To offset the voltage by a negative value.

CPU Voltage [Auto]

Allows you to set the CPU voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

iGPU Offset Mode Sign [+]

[+]   To offset the voltage by a positive value.
[-]   To offset the voltage by a negative value.

iGPU Offset Voltage [Auto]
This item appears only when you set the iGPU Offset Voltage to [Offset Mode], and allows you to set the iGPU Offset voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

iGPU Voltage [Offset Mode]

[Manual Mode]   Allows you to set a fixed iGPU voltage.
[Offset Mode]   Allows you to set the offset voltage.

iGPU Manual Voltage [Auto]
This item appears only when you set the iGPU Voltage to [Manual Mode], and allows you to set a fixed iGPU voltage. The values range from 0.800V to 1.990V with a 0.005V interval.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.20V to 2.20V with a 0.01V interval.

> According to Intel CPU spec, DIMMs with voltage requirement over 1.5V may damage the CPU permanently. We recommend you install the DIMMs with the voltage requirement below 1.5V.

VCCIO Voltage [Auto]

Allows you to set the VCCIO voltage. The values range from 0.90V to 1.70V with a 0.01V interval.

VCCSA Voltage [Auto]

Allows you to set the VCCSA voltage. The values range from 0.77V to 1.60V with a 0.01V interval.

CPU PLL Voltage [Auto]

Allows you to set the CPU PLL voltage. The values range from 1.20V to 2.20V with a 0.01V interval.

Load-Line Calibration [Auto]

Load-line is defined by Intel VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher load-line calibration would get higher voltage and better overclocking performance, but increase the CPU and VRM thermal. Configuration options: [Auto] [Disabled] [Enabled]

> The actual performance boost may vary depending on your CPU specification.

CPU Spread Spectrum [Auto]

[Auto]   Automatic configuration.

[Disabled]   Enhances the BCLK overclocking ability.

[Enabled]   Sets to [Enabled] for EMI control.

4.5　Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

⚠️　Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.

4.5.1　Trusted Computing

TPM SUPORT [Disabled]

Allows you to enable or disable the TPM support.
Configuration options: [Disabled] [Enabled]

✏️　This item appears only when you install TPM module to the motherboard.

4.5.2 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.

> The items shown in this screen may be different due to the CPU you installed.

Scroll down to display the following items:

Intel Adaptive Thermal Monitor [Enabled]

[Disabled]   Disables the CPU thermal monitor function.

[Enabled]   Enables the overheated CPU to throttle its clock speed to cool down.

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor package. Configuration options: [All] [1] [2] [3]

Limit CPUID Maximum [Disabled]

[Disabled]   Disables this function.

[Enabled]   Allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

Execute Disable Bit [Enabled]

[Disabled] Forces the XD feature flag to always return to zero (0).

[Enabled] Enables the No-Execution Page Protection Technology.

Intel(R) Virtualization Technology [Disabled]

[Disabled] Disables this function.

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

Hardware Prefetcher [Enabled]

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled] Disables this function.

Adjacent Cache Line Prefetch [Enabled]

[Enabled] Allows a hardware platform to perform adjacent cache line prefetching.

[Disabled] Disables this function.

CPU Power Management Configuration

This item allows you to manage and configure the CPU's power.

CPU Ratio [Auto]
Allows you to set the ratio between the CPU Core Clock and the BCLK Frequency. Use <+> and <-> keys to adjust the ratio. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]
Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).
[Disabled] The CPU runs at its default speed.
[Enabled} The operating system controls the CPU speed.

Turbo Mode [Enabled]
Allows you to set the processor cores to run faster than the marked frequency in a specific condition.
Configuration options: [Enabled] [Disabled]

CPU C1E [Auto]
[Auto] Set this item automatically.

[Enabled] Enables the C1E support function. This function must be enabled to enable or disable the Intel® Turbo Mode Technology.

[Disabled] Disables the function.

CPU C3 Report [Auto]

Allows you to disable or enable the CPU C3 report to OS.

[Auto]   Set this item automatically.

[Enabled]   Enables the C3 Report support function.

[Disabled]   Disables the function.

CPU C6 Report [Auto]

Allows you to disable or enable the CPU C6 report to OS.

[Auto]   Set this item automatically.

[Enabled]   Enables the C6 Report support function.

[Disabled] Disables the function.

4.5.3   PCH Configuration

High Precision Timer [Enabled]

Allows you to enable or disable the High Precision Event Timer.
Configuration options: [Enabled] [Disabled]

Intel(R) Rapid Start Technology

Intel(R) Rapid Start Technology [Disbled]

Allows you to enable or disable Intel(R) Rapid Start Technology.
Configuration options: [Enabled] [Disabled]

> The following items appears only when you set the Intel(R) Rapid Start Technology to **[Enabled]**.

Entry on S3 RTC Wake [Enabled]
Allows you to enable or disable Entry on S3 RTC Wake.
Configuration options: [Enabled] [Disabled]

Entry After [Immediately]
Enable RTC wake timer at S3 enrty.
Configuration options: [Immediately] [1 minute] [2 minutes] [5 minutes] [10 minutes] [15 minutes] [30 minutes] [1 hour] [2 hours]

Active Page Threshold Support [Enabled]
Allows you to enable or disable Active Page Threshold Support.
Configuration options: [Enabled] [Disabled]

Active Memory Threshold [0]
Try to support RST when partition size>Active Page Threshold size in MB.
When setting to Zero, it will be in AUTO mode and check if partition size is
enough at S3 entry.

Intel(R) Smart Connect Technology

ISCT Configuration [Disabled]

Allows you to enable or disable the ISCT configuration.
Configuration options: [Enabled] [Disabled]

4.5.4   SATA Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices.
The SATA Port items show **Not Present** if no SATA device is installed to the
corresponding SATA port.

Scroll down to display the following items:

SATA Mode Selection [AHCI]

Allows you to set the SATA configuration.

[IDE]   Set to [IDE] when you want to use the Serial ATA hard disk drives
               as Parallel ATA physical storage devices.
[AHCI]   Set to [AHCI] when you want the SATA hard disk drives to use the
               AHCI (Advanced Host Controller Interface). The AHCI allows the
               onboard storage driver to enable advanced Serial ATA features that
               increases storage performance on random workloads by allowing
               the drive to internally optimize the order of commands.
[RAID]   Set to [RAID] when you want to create a RAID configuration from
               the SATA hard disk drives.

S.M.A.R.T. Status Check [Enabled]

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitor
system. When read/write of your hard disk errors occur, this feature allows the hard
disk to report warning messages during the POST.
Configuration options: [Enabled] [Disabled]

Hot Plug [Disabled]

Allows you to enable or disable the hot plug function of each SATA port. This item
appears only when you set **SATA Mode** to [AHCI Mode] or [RAID Mode]

4.5.5   System Agent Configuration

Memory Remap Feature [Enabled]

Allows you to enable remapping the memory above 4GB.

[Enabled]   Enables the function.
[Disabled]   Disables this function.

Intel (R) VT-d [Disabled]

Allows you to enable or disable the Intel(R) VT-d function.

Configuration options: [Enabled] [Disabled]

Graphics Configuration

Allows you to select a primary display from iGPU, and PCIe graphical devices.

Primary Display [Auto]
Allows you to select which of the iGPU/PCIE Graphics device should be the
Primary Display.
Configuration options: [Auto] [PCIE] [PCI] [iGPU]

iGPU Memory [64M]
Allows you to select the iGPU share memory size.
Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M]
[256M] [288M] [320M] [352M] [384M] [416M] [448M] [480M] [512M] [1024M]

Render Standby [Enabled]
Allows you to enable or disable the Render Standby by the internal graphics
device. Configuration options: [Disabled] [Enabled]

iGPU Multi-Monitor [Disabled]
Allows you to enable or disable the internal graphics device multi-monitor
support for the add-on VGA devices. Configuration options: [Disabled]
[Enabled]

4.5.6 USB Configuration

The items in this menu allow you to change the USB-related features.

The **USB Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

Legacy USB Support [Enabled]

[Enabled]   Enables the support for USB devices on legacy operating systems (OS).

[Disabled]   The USB devices can be used only for the BIOS setup program.

[Auto]   Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

Legacy USB3.0 Support [Enabled]

[Enabled]   Enables the support for USB 3.0 devices on legacy operating systems (OS).

[Disabled]   Disables the function.

Intel xHCI Mode [Smart Auto]

[Smart Auto] Enables optimized xHCI.

[Auto]   Allows the system to set the xHCI.

[Enabled]   Enables the operation of xHCI controller.

[Disabled]   Disables the function.

EHCI Hand-off [Disabled]

[Enabled]   Enables the support for operating systems without an EHCI hand-off feature.

[Disabled]   Disables the function.

4.5.7 Onboard Devices Configuration

HD Audio Controller [Enabled]

[Disabled]   Disables the controller.

[Enabled]   Enables the High Definition Audio Controller.

> The following two items appear only when you set the **HD Audio Controller** item to [Enabled].

Front Panel Type [HD]

Allows you to set the front panel audio connector (AAFP) mode to legacy AC'97 or high-definition audio depending on the audio standard that the front panel audio module supports.

[HD]   Sets the front panel audio connector (AAFP) mode to high definition audio.

[AC97]   Sets the front panel audio connector (AAFP) mode to legacy AC'97.

VIA 1394 Controller [Enabled]

[Disabled]   Disables the controller.

[Enabled]   Enables the onboard IEEE 1394a controller.

Intel LAN1 Controller [Enabled]

[Disabled]   Disables the controller.

[Enabled]   Enables the Intel LAN1 controller.

Intel LAN1 OPROM [Disabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the PXE OptionRom of the Intel LAN1 controller.
Configuration options: [Enabled] [Disabled]

Intel LAN2 Controller [Enabled]

[Disabled]   Disables the controller.

[Enabled]   Enables the Intel LAN2 controller.

Intel LAN2 OPROM [Disabled]

This item appears only when you set the previous item to [Enabled] and allows you to enable or disable the PXE OptionRom of the Intel LAN2 controller.
Configuration options: [Enabled] [Disabled]

Serial Port Configuration

The sub-items in this menu allow you to set the serial port configuration.

	This item functions only if there is a serial port (COM1) connector on the motherboard.

Serial Port [Enabled]
Allows you to enable or disable the serial port (COM).
Configuration options: [Enabled] [Disabled]

Change Settings [IO=3F8h; IRQ=4]
Allows you to select the **Serial Port** base address. This item appears when **Serial Port** is set to [Enabled].
Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3]
[IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

Parallel Port Configuration

The sub-items in this menu allow you to set the parallel port configuration.

Parallel Port [Enabled]
Allows you to enable or disable the parallel port (LPT/LPTE).
Configuration options: [Enabled] [Disabled]

Change Settings [Auto]
Allows you to select an optimal setting for the super IO device.
Configuration options: [Auto] [IO=378h; IRQ=5]
[IO=378h: IRQ=5, 6, 7, 9, 10, 11, 12] [IO=278h; IRQ=5, 6, 7, 9, 10, 11, 12]
[IO=3BCh; IRQ=5, 6, 7, 9, 10, 11, 12]

Device Mode [STD Printer Mode]
Allows you to select the printer port mode.
Configuration options: [STD Printer mode] [SPP Mode] [EPP-1.9 and SPP Mode] [EPP-1.7 and SPP Mode] [ECP Mode] [ECP and EPP 1.9 Mode] [ECP and EPP 1.7 Mode]

4.5.8 APM

ErP Ready [Disabled]
This item allows user to switch off some power at S5 to get the system ready for ErP requirement. When set enabled to Enabled, all other PME options will be switched off. Configuration options: [Disabled] [Enabled]

Restore AC Power Loss [Power Off]

[Power Off]   The system goes into off state after an AC power loss.

[Power On]   The system goes into on state after an AC power loss.

[Last State]   The system goes into either off or on state, whatever the system state was before the AC power loss.

Power On By PS/2 Keyboard [Disabled]

[Disabled]   Disables the Power On by a PS/2 keyboard.

[Space Bar]   Sets the Space Bar on the PS/2 keyboard to turn on the system.

[Ctrl-Esc]   Sets the Ctrl+Esc key on the PS/2 keyboard to turn on the system.

[Power Key]   Sets Power key on the PS/2 keyboard to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By PS/2 Mouse [Disabled]

[Disabled]   Disables the Power On by a PS/2 mouse.

[Enabled]   Enables the Power On by a PS/2 mouse. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By PCI [Disabled]

[Disabled]   Disables the PCI devices to generate a wake event.

[Enabled]   Enables the PCI devices to generate a wake event.

Power On By PCIE [Disabled]

[Disabled]   Disables the PCIE devices to generate a wake event.

[Enabled]   Enables the PCIE devices to generate a wake event.

Power On By Ring [Disabled]

[Disabled]   Disables Ring to generate a wake event.

[Enabled]   Enables Ring to generate a wake event.

Power On By RTC [Disabled]

[Disabled]   Disables RTC to generate a wake event.

[Enabled]   When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/Minute/Second** will become user-configurable with set values.

4.5.9   Network Stack

Network Stack [Disable Link]

This item allows user to disable or enable the UEFI network stack.
Configuration options: [Disable Link] [Enabled]

> The following items appears only when you set the Network Stack to **[Enabled]**.

Ipv4 PXE Support [Enable]

This item allows user to disable or enable the Ipv4 PXE Support.
Configuration options: [Disable Link] [Enabled]

Ipv6 PXE Support [Enable]

This item allows user to disable or enable the Ipv6 PXE Support.
Configuration options: [Disable Link] [Enabled]

4.6   Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.

Scroll down to display the following items:

CPU Temperature / MB Temperature [xxxºC/xxxºF]

The onboard hardware monitor automatically detects and displays the CPU and motherboard temperatures. Select **Ignore** if you do not wish to display the detected temperatures.

CPU Fan Speed [xxxx RPM] or [Ignore] / [N/A]
Chassis Fan 1/2/3 Speed [xxxx RPM] or [Ignore] / [N/A]
Power Fan Speed [xxxx RPM] or [Ignore] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU, chassis, and power fan speed in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows **N/A**. Select **Ignore** if you do not wish to display the detected speed.

CPU Q-Fan Control [Enabled]

[Disabled]   Disables the CPU Q-Fan control feature.

[Enabled]   Enables the CPU Q-Fan control feature.

CPU Fan Speed Low Limit [600 RPM]

This item appears only when you enable the **CPU Q-Fan Control** feature and allows you to disable or set the CPU fan warning speed.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

CPU Fan Profile [Standard]

This item appears only when you enable the **CPU Q-Fan Control** feature and allows you to set the appropriate performance level of the CPU fan.

[Standard] Sets to [Standard] to make the CPU fan automatically adjust depending on the CPU temperature.

[Silent]   Sets to [Silent] to minimize the fan speed for quiet CPU fan operation.

[Turbo]   Sets to [Turbo] to achieve maximum CPU fan speed.

[Manual]   Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set **CPU Fan Profile** to [Manual].

CPU Upper Temperature [70]
Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 20ºC to 75ºC.

CPU Fan Max. Duty Cycle(%) [100]
Use the <+> and <-> keys to adjust the maximum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

CPU Lower Temperature [20]
Displays the lower limit of the CPU temperature. The values range from 20ºC to 75ºC.

CPU Fan Min. Duty Cycle(%) [20]
Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature is under 40ºC, the CPU fan will operate at the minimum duty cycle.

Chassis Q-Fan Control [Enabled]

[Disabled]   Disables the Chassis Q-Fan control feature.

[Enabled]   Enables the Chassis Q-Fan control feature.

Chassis Fan Speed Low Limit [600 RPM]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to disable or set the chassis fan warning speed.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan Profile [Standard]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to set the appropriate performance level of the chassis fan.

[Standard] Sets to [Standard] to make the chassis fan automatically adjust depending on the chassis temperature.

[Silent] Sets to [Silent] to minimize the fan speed for quiet chassis fan operation.

[Turbo] Sets to [Turbo] to achieve maximum chassis fan speed.

[Manual] Sets to [Manual] to assign detailed fan speed control parameters.

The following four items appear only when you set **Chassis Fan Profile** to [Manual].

Chassis Upper Temperature [70]
Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 40ºC to 90ºC.

Chassis Fan Max. Duty Cycle(%) [100]
Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Lower Temperature [40]
Displays the lower limit of the chassis temperature.

Chassis Fan Min. Duty Cycle(%) [60]
Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature is under 40ºC, the chassis fan will operate at the minimum duty cycle.

CPU Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select **Ignore** if you do not want to detect this item.

Anti Surge Support [Enabled]

This item allows you to enable or disable the Anti Surge function.
Configuration options: [Disabled] [Enabled]

4.7 Boot menu

The Boot menu items allow you to change the system boot options.

Scroll down to display the following items:

Bootup NumLock State [On]

[On]   Sets the power-on state of the NumLock to [On].
[Off]   Sets the power-on state of the NumLock to [Off].

Full Screen Logo [Enabled]

[Disabled]   Disables the full screen logo display feature.
[Enabled]   Enables the full screen logo display feature.

Set this item to [Enabled] to use the ASUS MyLogo 2™ feature.

Wait For 'F1' If Error [Enabled]

[Disabled]   Disables this function.
[Enabled]   The system waits for the <F1> key to be pressed when error occurs.

Option ROM Messages [Force BIOS]

[Force BIOS]   The third-party ROM messages will be forced to display during the boot sequence.

[Keep Current] The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

Setup Mode [EZ Mode]

[Advanced Mode]   Sets Advanced Mode as the default screen for entering the BIOS setup program.

[EZ Mode]   Sets EZ Mode as the default screen for entering the BIOS setup program.

UEFI/Legacy Boot [Enable both UEFI and Legacy]

[Enable both UEFI and Legacy]   Enables both UEFI and Legacy boot.
[Disable UEFI]   Enables the Legacy boot, and disables the UEFI boot.
[Disable Legacy]   Enables the UEFI booth, and disables the Legacy boot.

PCI ROM Priority [Legacy ROM]

[Legacy ROM]   Launch Legacy ROM
[EFI Compatibe ROM]   Launch UEFI Compatible ROM

Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.

> •   To select the boot device during system startup, press <F8> when ASUS Logo appears.
>
> •   To access Windows OS in Safe Mode, do any of the following:
>   - Press <F5> when ASUS Logo appears.
>   - Press <F8> after POST.

Boot Override

These items displays the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

4.8 Tools menu

The Tools menu items allow you to configure options for special functions. Select an item then press <Enter> to display the submenu.
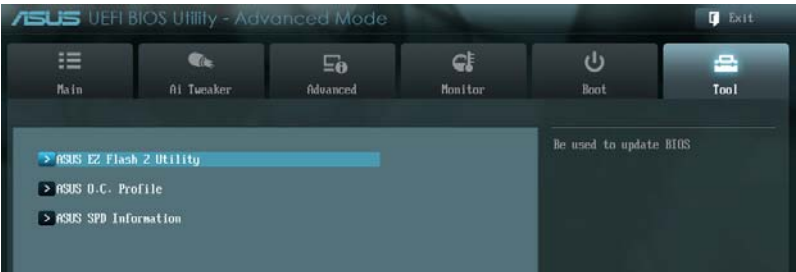
4.8.1 ASUS EZ Flash 2 Utility

Allows you to run ASUS EZ Flash 2. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice.

For more details, refer to **section 3.10.2 ASUS EZ Flash 2 utility**.

4.8.2 ASUS O.C. Profile

This item allows you to store or load multiple BIOS settings.
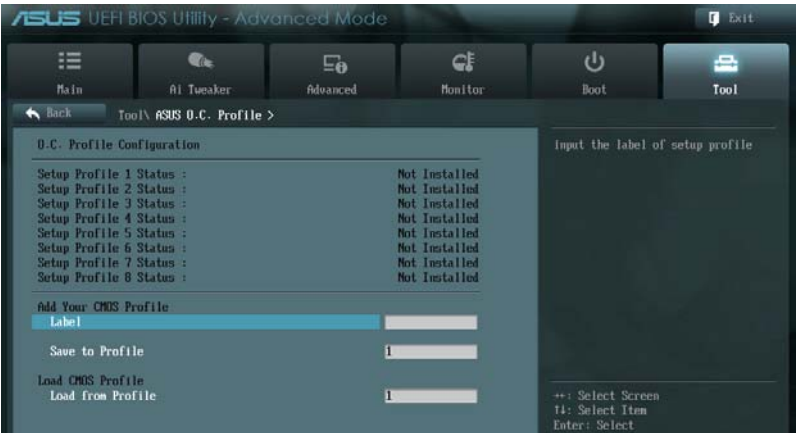
The **Setup Profile Status** items show **Not Installed** if no profile is created.

Label

Allows you to input the label of the setup profiles.

Save to Profile

Allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

Load from Profile

Allows you to load the previous BIOS settings saved in the BIOS Flash. **Key in the** profile number that saved your BIOS settings, press <Enter>, and then select **Yes**.

- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!

- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

4.8.3 ASUS SPD Information

Allows you to view the DRAM SPD information.

4.9 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items. You can access the **EZ Mode** from the Exit menu.

```
                           Exit

              Load Optimized Defaults

              Save Changes & Reset

              Discard Changes & Exit


              ASUS EZ Mode

         Launch EFI Shell from filesystem device
```
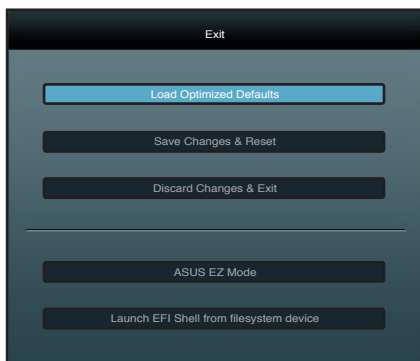
Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **Yes** to load the default values.

Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press <F10>, a confirmation window appears. Select **Yes** to save changes and exit.

Discard Changes & Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select **Yes** to discard changes and exit.

ASUS EZ Mode

This option allows you to enter the EZ Mode screen.

Launch EFI Shell from filesystem device

This option allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available filesystem devices.

4.10 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility, or performance. However, BIOS updating is potentially risky. If there is no problem using the current version of BIOS, **DO NOT manually update the BIOS**. Inappropriate BIOS updating may result in the system's failure to boot. Carefully follow the instructions of this chapter to update your BIOS if necessary.

Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

The following utilities allow you to manage and update the motherboard BIOS setup program.

1. **ASUS Update:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2:** Updates the BIOS using a USB flash drive.
3. **ASUS CrashFree BIOS 3:** Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.
4. **ASUS BIOS Updater:** Updates and backups the BIOS in DOS environment using the motherboard support DVD and a USB flash disk drive.

Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a USB flash disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the **ASUS Update** or **BIOS Updater** utilities.

4.10.1　ASUS Update utility

The ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment. The ASUS Update utility allows you to:

• Update the BIOS directly from the Internet
• Download the latest BIOS file from the Internet
• Update the BIOS from an updated BIOS file
• Save the current BIOS file
• View the BIOS version information

This utility is available in the support DVD that comes with the motherboard package.

> ASUS Update requires an Internet connection either through a network or an Internet Service Provider (ISP).

Launching ASUS Update

After installing AI Suite II from the motherboard support DVD, launch ASUS Update by clicking **Update > ASUS Update** on the AI Suite II main menu bar.

> Quit all Windows® applications before you update the BIOS using this utility.

Updating the BIOS through the Internet

To update the BIOS through the Internet:

1. From the ASUS Update screen, select **Update BIOS from Internet**, and then click **Next**.

2. Select the ASUS FTP site nearest you to avoid network traffic.

    If you want to enable the BIOS downgradable function and auto BIOS backup function, check the checkboxs before the two items on the screen.
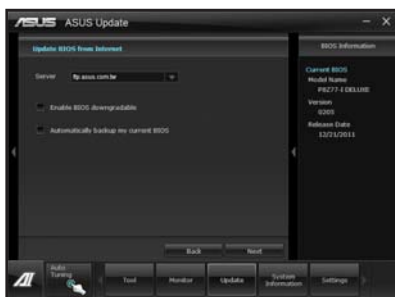
3. Select the BIOS version that you

4. You can decide whether to change the BIOS boot logo, which is the image appearing on screen during the Power-On Self-Tests (POST). Click **Yes** if you want to change the boot logo or **No** to continue.

5. Follow the onscreen instructions to complete the update process.
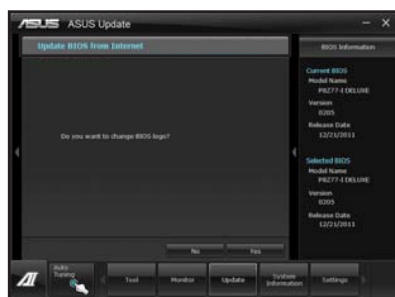
Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. From the ASUS Update screen, select **Update BIOS from file**, and then click **Next**.
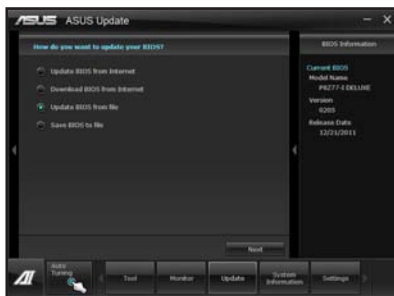
2. Locate the BIOS file from the Open window, click **Open**, and
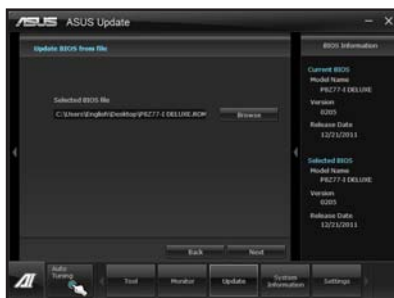
    click **Next**.

3. You can decide whether to change the BIOS boot logo. Click **Yes** if you want to change the boot logo or **No** to continue.

4. Follow the onscreen instructions to complete the update process.

- The screenshots in this section are for reference only. The actual BIOS information vary by models.

- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

4.10.2 ASUS EZ Flash 2 utility

The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a bootable floppy disk or an OS-based utility.

Before you start using this utility, download the latest BIOS from the ASUS website
at www.asus.com.

To update the BIOS using EZ Flash 2:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. **Enter the Advanced Mode of the BIOS setup program. Go to the Tool** menu to select **ASUS EZ Flash Utility** and press <Enter> to enable it.
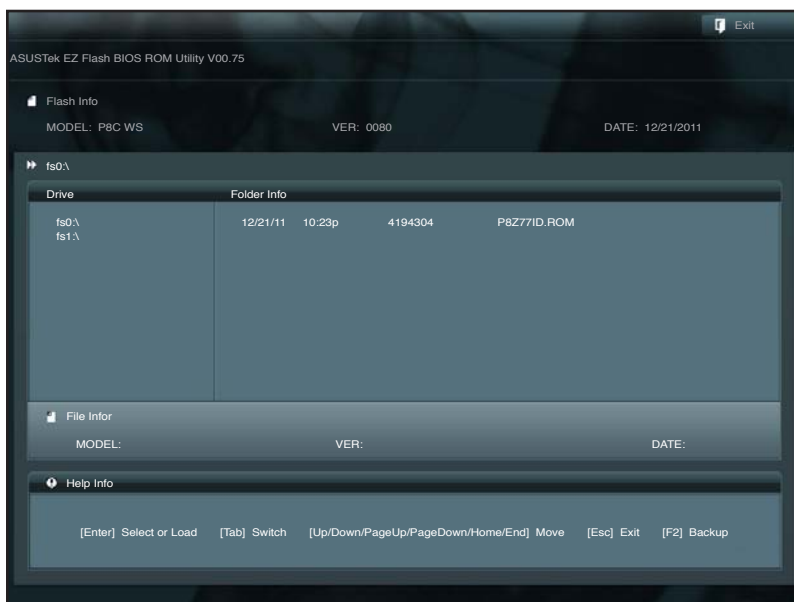
3. Press <Tab> to switch to the Drive field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, and then press <Enter>.
5. Press <Tab> to switch to the Folder Info field.
6. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.

- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu. See section **3.9 Exit Menu** for details.

4.10.3   ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 utility is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.

The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at support.asus.com and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS:

1.   Turn on the system.
2.   Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3.   The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 2 utility automatically.
4.   The system requires you to enter BIOS Setup to recover BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.

DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!

4.10.4   ASUS BIOS Updater

The ASUS BIOS Updater allows you to update BIOS in DOS environment. This utility also allows you to copy the current BIOS file that you can use as a backup when the BIOS fails or gets corrupted during the updating process.

The succeeding utility screens are for reference only. The actual utility screen displays may not be same as shown.

Before updating BIOS

1.   Prepare the motherboard support DVD and a USB flash drive in FAT32/16 format and single partition.

2.   Download the latest BIOS file and BIOS Updater from the ASUS website at http://support.asus.com and save them on the USB flash drive.

•   NTFS is not supported under DOS environment. Do not save the BIOS file and BIOS Updater to a hard disk drive or USB flash drive in NTFS format.

•   Do not save the BIOS file to a floppy disk due to low disk capacity.

3.   Turn off the computer and disconnect all SATA hard disk drives (optional).

Booting the system in DOS environment

1.   Insert the USB flash drive with the latest BIOS file and BIOS Updater to the USB port.

2.   Boot your computer. When the ASUS Logo appears, press <F8> to show the **BIOS Boot Device Select Menu**. Insert the support DVD into the optical drive and select the optical drive as the boot device.

```
            Please select boot device:

  SATA: XXXXXXXXXXXXXXXX
  USB  XXXXXXXXXXXXXXXX
  UEFI: XXXXXXXXXXXXXXXX
  Enter Setup

          ↑ and ↓ to move selection
          ENTER to select boot device
          ESC to boot using defaults
```
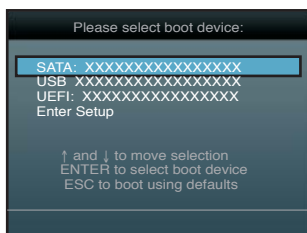
3.   When the **Make Disk** menu appears, select the **FreeDOS command prompt** item by pressing the item number.

4.   At the FreeDOS prompt, type `d:` and press <Enter> to switch the disk from Drive C (optical drive) to Drive D (USB flash drive).

```
Welcome to FreeDOS (http://www.freedos.org)!
C:\>d:
D:\>
```

Backing up the current BIOS

To backup the current BIOS file using the BIOS Updater

> Ensure that the USB flash drive is not write-protected and has enough free space to save the file.

1. At the FreeDOS prompt, type **bupdater /o[filename]** and press <Enter>.

```
D:\>bupdater /oOLDBIOS1.rom
```

  Filename   Extension

  The [filename] is any user-assigned filename with no more than eight alphanumeric characters for the filename and three alphanumeric characters for the extension.

2. The BIOS Updater backup screen appears indicating the BIOS backup process. When BIOS backup is done, press any key to return to the DOS prompt.

```
            ASUSTek BIOS Updater for DOS V1.30 [2012/12/22]

        ────── Current ROM ──────          ────── Update ROM ──────
        BOARD: P8C WS                       BOARD: Unknown
        VER: 0301                           VER: Unknown
        DATE: 01/24/2011                    DATE: Unknown
    PATH: A:\

        ┌──────────────────────────────────────────────────────┐
        │      BIOS backup is done! Press any key to continue.  │
        └──────────────────────────────────────────────────────┘




        ── Note ──
        Saving BIOS:
```
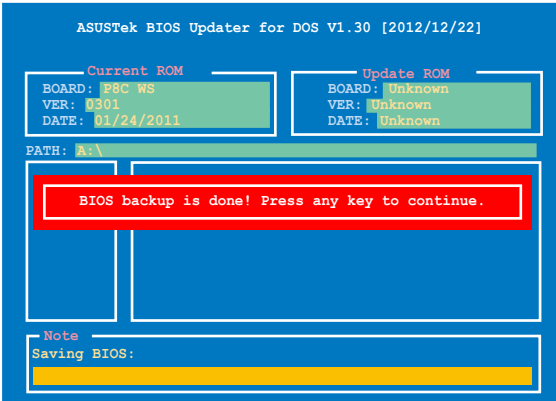
Updating the BIOS file

To update the BIOS file using BIOS Updater

1.   At the FreeDOS prompt, type **bupdater /i<xxxxx.rom>** and press
      <Enter>.

```
D:\>bupdater /i<xxxxx.rom>
```

2.   The BIOS Updater screen appears as below.

```
     ASUSTek BIOS Updater for DOS V1.30 [2012/12/22]
    FLASH TYPE: MX1C 25L1065A
     ── Current ROM ──                  ── Update ROM ──
    BOARD: P8C WS                     BOARD: Unknown
    VER: 0205                         VER: Unknown
    DATE: 12/21/2011                  DATE: Unknown
  PATH: A:\

  A:          P8CWSID.CAP      2097152 2012-03-15 17:30:48




    ── Note ──
     [Enter] Select or Load    [Tab] Switch    [V] Drive Info
     [Up/Down/Home/End] Move   [B] Backup      [Esc] Exit
```

3.   Press <Tab> to switch between screen fields and use the <Up/Down/Home/
      End> keys to select the BIOS file and press <Enter>. BIOS Updater checks
      the selected BIOS file and prompts you to confirm BIOS update.

```
          Are you sure to update BIOS?

                 Yes     No
```

4.   Select **Yes** and press <Enter>. When BIOS update is done, press <ESC> to
      exit BIOS Updater. Restart your computer.

> DO NOT shut down or reset the system while updating the BIOS to prevent
> system boot failure!

> •   For BIOS Updater version 1.04 or later, the utility automatically exits to the
>   DOS prompt after updating BIOS.
>
> •   Ensure to load the BIOS default settings to ensure system compatibility and
>   stability. Select the **Load Optimized Defaults** item under the **Exit** BIOS
>   menu. See Chaper 3 of your motherboard user manual for details.
>
> •   Ensure to connect all SATA hard disk drives after updating the BIOS file if
>   you have disconnected them.

Chapter 5

This chapter provides information on how to configure your hard disk drives as RAID sets.

RAID configuration

5.1 RAID configurations

The motherboard supports the following SATA RAID solutions:

- **Intel® Rapid Storage Technology** with RAID 0, RAID 1, RAID 10 and RAID 5 support.
- **Mavell® RAID utility** with RAID 0 and RAID 1 support.

- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

- Due to Windows® XP / Vista limitation, a RAID array with the total capacity over 2TB cannot be set as a boot disk. A RAID array over 2TB can only be set as a data disk only.

- If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section **4.5 Creating a RAID driver disk** for details.

5.1.1 RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

5.1.2   Installing Serial ATA hard disks

The motherboard supports Serial ATA hard disk drives. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for a RAID configuration:

1.   Install the SATA hard disks into the drive bays.

2.   Connect the SATA signal cables.

3.   Connect a SATA power cable to the power connector on each drive.

5.1.3   Setting the RAID item in BIOS

You must enable the RAID function in the BIOS Setup before creating RAID set(s) using SATA HDDs. To do this:

1.   Enter the BIOS Setup during POST.

2.   Go to the **Advanced** menu > **SATA Configuration**, and then press <Enter>.

3.   Set the **SATA Mode** item to [RAID Mode].

4.   Save your changes, and then exit the BIOS Setup.

> Refer to Chapter 3 for details on entering and navigating through the BIOS Setup.

> Due to chipset limitation, when set any of SATA ports to RAID mode, all SATA ports run at RAID mode together.

5.1.4   Intel® Rapid Storage Technology Option ROM utility

To enter the Intel® Rapid Storage Technology Option ROM utility:

1.   Turn on the system.

2.   During POST, press <Ctrl> + <I> to display the utility main menu.

```
          Intel(R) Rapid Storage Technology - Option ROM - v10.5.1.1070
          Copyright(C) 2003-10 Intel Corporation.  All Rights Reserved.
================================[ MAIN MENU ]================================
          1. Create RAID Volume              4. Recovery Volume Options
          2. Delete RAID Volume              5. Acceleration Options
          3. Reset Disks to Non-RAID         6. Exit

========================[ DISK/VOLUME INFORMATION ]=========================
     RAID Volumes:
     None defined.

     Physical Devices:
     Port Device Model    Serial #               Size  Type/Status(Vol ID)
     0    ST3160812AS     9LS0HJA4              149.0GB  Non-RAID Disk
     1    ST3160812AS     9LS0F4HL              149.0GB  Non-RAID Disk
     2    ST3160812AS     3LS0JYL8              149.0GB  Non-RAID Disk
     3    ST3160812AS     9LS0BJ5H              149.0GB  Non-RAID Disk




        [↑↓]-Select            [ESC]-Exit          [ENTER]-Select Menu
```

The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

The utility supports maximum four hard disk drives for RAID configuration.

Creating a RAID set

To create a RAID set:

1.   From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears:

```
        Intel(R) Rapid Storage Technology - Option ROM - v10.5.1.1070
        Copyright(C) 2003-10 Intel Corporation.  All Rights Reserved.

                         [ CREATE VOLUME MENU ]

                         Name:   Volume0
                   RAID Level:   RAID0(Stripe)
                        Disks:   Select Disks
                   Strip Size:    128KB
                     Capacity:   0.0    GB
                         Sync:   N/A
                                 Create Volume


                              [ HELP ]




        Enter a unique volume name that has no special characters and is
                           16 characters or less.




    [↑↓]Change      [TAB]-Next      [ESC]-Previous Menu      [ENTER]-Select
```

2.   Enter a name for the RAID set and press <Enter>.

3.   When the **RAID Level** item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.

4.   When the **Disks** item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The **SELECT DISKS** screen appears:

```
                            [ SELECT DISKS ]
    Port Drive Model       Serial #          Size   Status
    0    ST3160812AS       9LS0HJA4         149.0GB  Non-RAID Disk
    1    ST3160812AS       9LS0F4HL         149.0GB  Non-RAID Disk
    2    ST3160812AS       3LS0JYL8         149.0GB  Non-RAID Disk
    3    ST3160812AS       9LS0BJ5H         149.0GB  Non-RAID Disk


         Select 2 to 6 disks to use in creating the volume.


    [↑↓]-Prev/Next [SPACE]-SelectDisk [ENTER]-Done
```

5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.

6. Use the up/down arrow key to select the stripe size for the RAID array (for RAID 0, 10 and 5 only),and then press <Enter>. The available stripe size values range from 4KB to 128KB. The following are typical values:
   RAID 0: 128KB
   RAID 10: 64KB
   RAID 5: 64KB

> We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

7. When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

8. When the **Create Volume** item is selected, press <Enter>. The following warning message appears:

```
        WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
       Are you sure you want to create this volume? (Y/N):
```

9. Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the **CREATE VOLUME** menu.
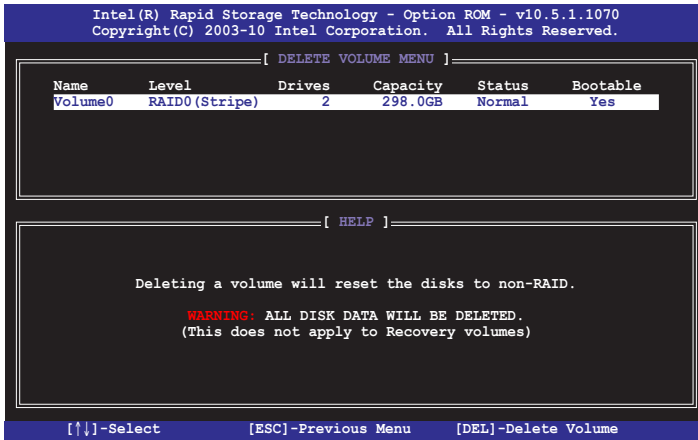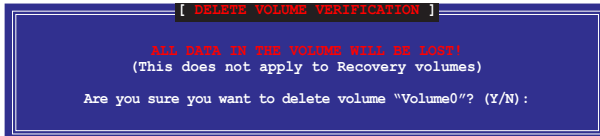
Deleting a RAID set

> ⚠️ Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the utility main menu, select **2. Delete RAID Volume** and press <Enter>. The following screen appears:

```
        Intel(R) Rapid Storage Technology - Option ROM - v10.5.1.1070
        Copyright(C) 2003-10 Intel Corporation.  All Rights Reserved.
                          [ DELETE VOLUME MENU ]
  Name        Level            Drives    Capacity    Status      Bootable
  Volume0     RAID0(Stripe)       2        298.0GB    Normal        Yes




                                 [ HELP ]



          Deleting a volume will reset the disks to non-RAID.

                WARNING: ALL DISK DATA WILL BE DELETED.
                (This does not apply to Recovery volumes)




       [↑↓]-Select          [ESC]-Previous Menu     [DEL]-Delete Volume
```

2. Use the up/down arrow key to select the RAID set you want to delete, and then press <Del>. The following warning message appears:

```
                    [ DELETE VOLUME VERIFICATION ]

               ALL DATA IN THE VOLUME WILL BE LOST!
             (This does not apply to Recovery volumes)

        Are you sure you want to delete volume "Volume0"? (Y/N):
```

3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the **DELETE VOLUME** menu.

Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

1. From the utility main menu, select **5. Exit**, and then press <Enter>. The following warning message appears:

```
                          [ CONFIRM EXIT ]

                Are you sure you want to exit? (Y/N):
```
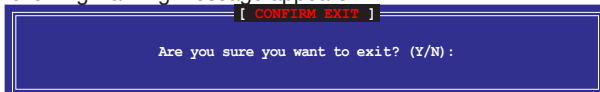
2. Press <Y> to exit or press <N> to return to the utility main menu.

Chapter 6

This chapter provides information on how to install the drivers for system components. This chapter also describes the software applications that the barebone workstation supports.

Driver installation

6.1 Creating a RAID driver disk

A floppy disk with the RAID driver is required when installing a Windows® operating system on a hard disk drive that is included in a RAID set.

> • **The motherboard does not provide a floppy drive connector.** You have to use a USB floppy disk drive when creating a **SATA** RAID driver disk.
>
> • Windows® XP may not recognize the USB floppy disk drive due to Windows® XP limitation. To work around this OS limitation, refer to section **4.5.4 Using a USB floppy disk drive**.

6.1.1 Creating a RAID driver disk without entering the OS

To create a RAID driver disk without entering the OS:

1. Boot your computer.
2. Press <Del> during POST to enter the BIOS setup utility.
3. Set the optical drive as the primary boot device.
4. Insert the support DVD into the optical drive.
5. Save changes and exit BIOS.
6. When the **Make Disk** menu appears, press <1> to create a RAID driver disk.
7. Insert a formatted floppy disk into the USB floppy disk drive, then press <Enter>.
8. Follow the succeeding screen instructions to complete the process.

6.1.2 Creating a RAID driver disk in Windows®

To create a RAID driver disk in Windows®:

1. Start Windows®.
2. Plug the USB floppy disk drive and insert a floppy disk.
3. Place the motherboard support DVD into the optical drive.
4. Go to the **Make Disk** menu, and then click **Intel AHCI/RAID Driver Disk** to create a RAID driver disk.
5. Select USB floppy disk drive as the destination disk.
6. Follow the succeeding screen instructions to complete the process.

> Write-protect the floppy disk to avoid a computer virus infection.

6.1.3 Installing the RAID driver during Windows® OS installation

To install the RAID driver in Windows® XP:

1. During the OS installation, the system prompts you to press the F6 key to install third-party SCSI or RAID driver.
2. Press <F6>, and then insert the floppy disk with RAID driver into the USB floppy disk drive.
3. When prompted to select the SCSI adapter to install, select the RAID driver for the corresponding OS version.
4. Follow the succeeding screen instructions to complete the installation.

To install the RAID driver for Windows® Vista or later OS:

1. During the OS installation, click **Load Driver** to allow you to select the installation media containing the RAID driver.
2. Insert the USB flash drive with RAID driver into the USB port or the support DVD into the optical drive, and then click **Browse**.
3. Click the name of the device you've inserted, go to **Drivers** > **RAID**, and then select the RAID driver for the corresponding OS version. Click **OK**.
4. Follow the succeeding screen instructions to complete the installation.

> Before loading the RAID driver from a USB flash drive, you have to use another computer to copy the RAID driver from the support DVD to the USB flash drive.
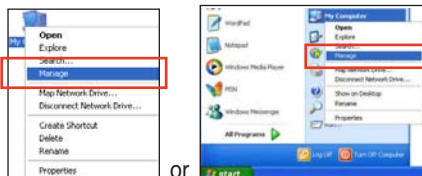
6.1.4 Using a USB floppy disk drive

Due to OS limitation, Windows® XP may not recognize the USB floppy disk drive when you install the RAID driver from a floppy disk during the OS installation.

To solve this issue, add the USB floppy disk drive's Vendor ID (VID) and Product ID (PID) to the floppy disk containing the RAID driver. Refer to the steps below:

1. Using another computer, plug the USB floppy disk drive, and insert the floppy disk containing the RAID driver.

2. Right-click **My Computer** on the Windows® desktop or **start** menu, and then select **Manage** from the pop-up window.

    or

3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.
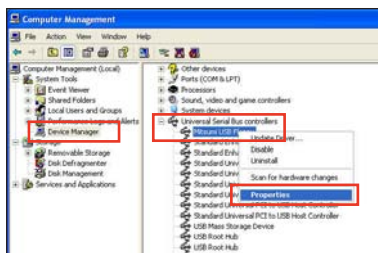
    > The name of the USB floppy disk drive varies with different vendors.

4. Click **Details** tab. The Vendor ID (VID) and Product ID (PID) are displayed.
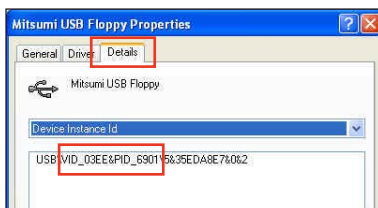
5. Browse the contents of the RAID driver disk to locate the file **txtsetup.oem**.

6. Double-click the file. A window appears, allowing you to select the program for opening the oem file.

7.	Use Notepad to open the file.

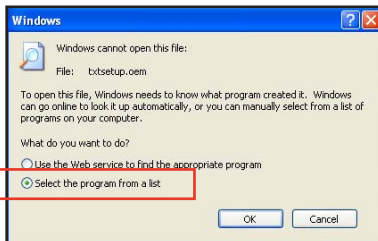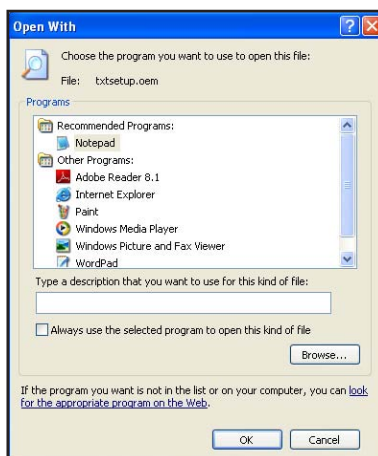8.	Find the **[HardwareIds.scsi.iaAHCI_DesktopWorkstationServer]** and **[HardwareIds.scsi.iaStor_DesktopWorkstationServer]** sections in the **txtsetup.oem** file.

9.	Type the following line to the bottom of the two sections:
	id = "USB\VID_xxxx&PID_xxxx", "usbstor"

```
[HardwareIds.scsi.iaAHCI_DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_1C02&CC_0106","iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"


[HardwareIds.scsi.iaStor_DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_2822&CC_0104","iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"
```

Add the same line to both sections.

The VID and PID vary with different vendors.

10.	Save and exit the file.

6.2 Support DVD information

The support DVD that comes with the motherboard package contains the drivers, software applications, and utilities that you can install to avail all motherboard features.

The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website at www.asus.com for updates.

6.2.1 Running the support DVD

Place the support DVD into the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer. Click each menu tab and select the items you want to install.

The Drivers menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to use the devices.

The Make Disk menu contains items to create the RAID/AHCI driver disk.

The Manual menu contains the list of supplementary user manuals. Click an item to open the folder of the user manual.

The Utilities menu shows the applications and other software that the motherboard supports.

Click the Contact tab to display the ASUS contact information.

Click an icon to display DVD/ motherboard information

Click an item to install

If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

6.2.2 Obtaining the software manuals

The software manuals are included in the support DVD. Follow the instructions below to get the necessary software manuals.

> The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

1. Click the **Manual** tab. Click **ASUS Motherboard Utility Guide** from the manual list on the left.

2. The **Manual** folder of the support DVD appears. Double-click the folder of your selected software.
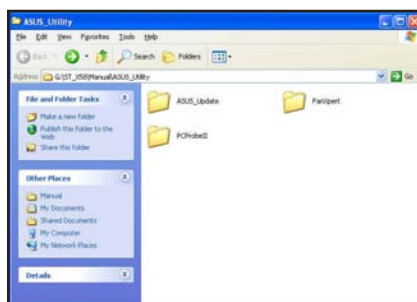
3. Some software manuals are provided in different languages. Double-click the language to show the software manual.
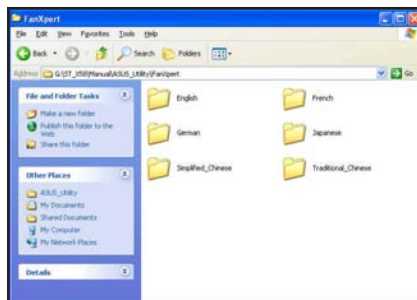
> The screenshots in this section are for reference only. The actual software manuals containing in the support DVD vary by models.

6.3   Installing AI Suite II

AI Suite II is an all-in-one interface that integrates several ASUS utilities and allows you to launch and operate these utilities simultaneously.

To install AI Suite II on your computer
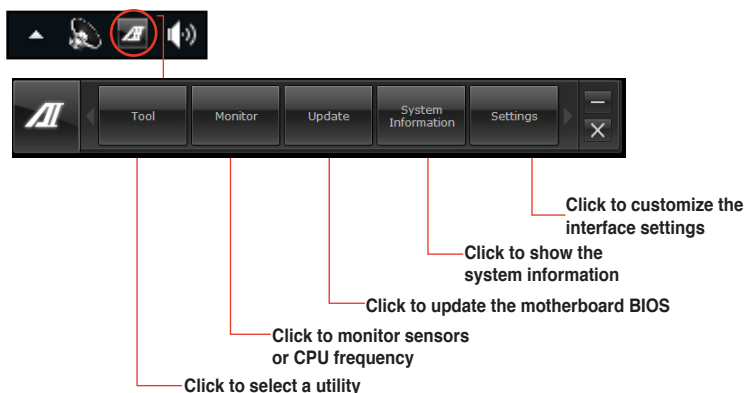
1.   Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has enabled the Autorun feature.
2.   Click **Utilities** tab **> AI Suite II**.
3.   Follow the onscreen instructions to complete the installation.

Using AI Suite II

AI Suite II automatically starts when you enter the Windows® operating system (OS). The AI Suite II icon appears in the Windows® notification area. Click the icon to open the AI Suite II main menu bar.

Click each button to select and launch a utility, to monitor the system, to update the motherboard BIOS, to display the system information, and to customize the settings of AI Suite II.

Click to customize the interface settings

Click to show the system information

Click to update the motherboard BIOS

Click to monitor sensors or CPU frequency

Click to select a utility

•   The applications in the Tool menu vary with models.

•   The screeshots of AI Suite II in this user manual are for reference only. The actual screenshots vary with models.

•   Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.
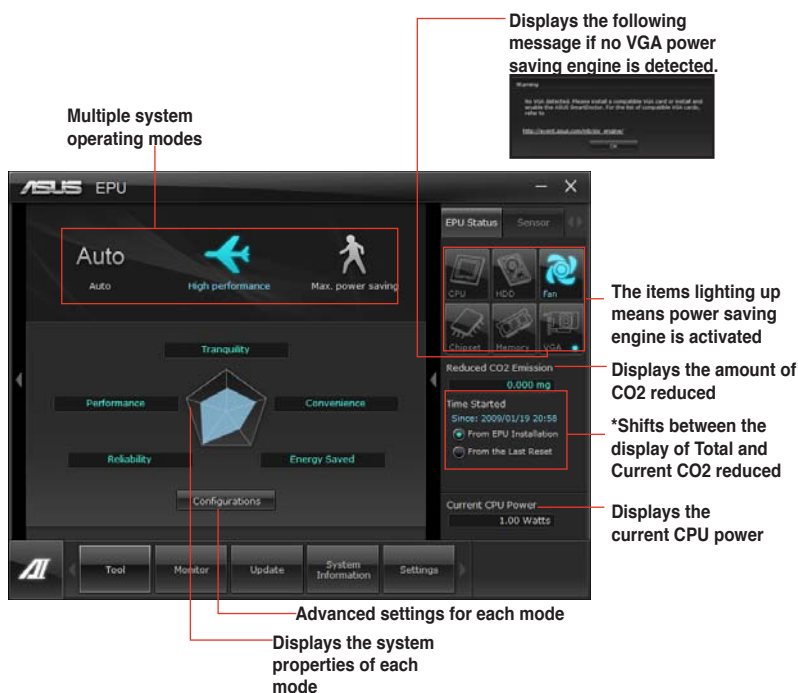
6.3.1　EPU

EPU is an energy-processing utility that provides several power-saving modes. When set to the Auto Mode, the system automatically changes its power-saving mode based on the current system condition.

You can also configure the system settings such as CPU frequency, GPU frequency, vCore Voltage, and Fan Control to customize a power-saving mode.

Launching EPU

To launch EPU, click **Tool > EPU** on the AI Suite II main menu bar.

Displays the following message if no VGA power saving engine is detected.

Multiple system operating modes

The items lighting up means power saving engine is activated

Displays the amount of CO2 reduced

***Shifts between the display of Total and Current CO2 reduced**

Displays the current CPU power

Advanced settings for each mode

Displays the system properties of each mode

---

*•   Select **From EPU Installation** to show the CO2 that has been reduced since you installed EPU.

*•   Select **From the Last Reset** to show the total CO2 that has been reduced since you click the Clear button [Clear].

•   Refer to the software manual in the support DVD or visit the ASUS website at
www.asus.com for detailed software configuration.

6.3.2 Probe II

Probe II is a utility that monitors the computer's vital components, and detects and alerts you of any problem with these components. Probe II senses fan rotations, CPU temperature, and system voltages, among others. With this utility, you are assured that your computer is always at a healthy operating condition.

Launching Probe II

To launch Probe II, click **Tool > Probe II** on the AI Suite II main menu bar.

Configuring Probe II

Click the **Voltage/Temperature/Fan Speed** tabs to activate the sensors or to adjust the sensor threshold values. The **Preference** tab allows you to customize the time interval of sensor alerts, or change the temperature unit.

Saves your configuration

Loads your saved configuration

Loads the default threshold values for each sensor

Applies your changes

> • Click **Monitor > Sensor** on the AI Suite II main menu bar and the system status will appear on the right panel.
>
> • Refer to the software manual in the support DVD or visit the ASUS website at
> www.asus.com for detailed software configuration.

6.3.3 Sensor Recorder

Sensor Recorder monitors the changes in the system voltage, temperature, and fan speed on a timeline. The History Record function allows you to designate specific time spans on record to keep track of the three system statuses for certain purposes.

Launching Sensor Recorder

To launch Sensor Recorder, click **Tool > Sensor Recorder** on the AI Suite II main menu bar.

Using Sensor Recorder

Click on **Voltage/ Temperature/ Fan Speed** tabs for the status you want to monitor. Colored lines will automatically appear on the diagram to indicate the immediate changes in the system status.

Using History Record

1. Click the **History Record** tab and adjust the settings on the left for **Record Interval** and **Record Duration** according to need.
2. Click **Start Recording** to start measuring and recording each sensor.
3. To stop recording, click **Recording** again.
4. To track the recorded contents, set **Type/ Date/ Select display items** to display the history details.
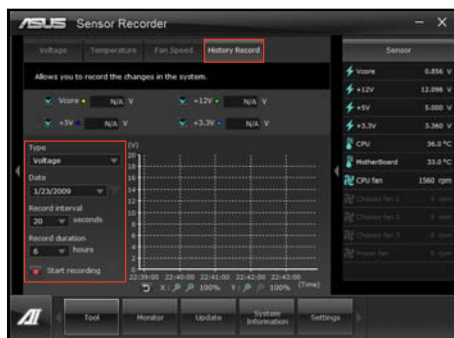
Click on **Monitor > Sensor** on the AI Suite II main menu bar and a highlight of the system statuses will appear on the right panel.
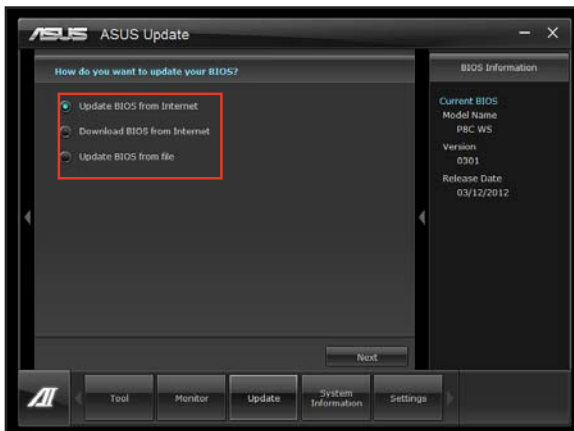
6.3.4 ASUS Update

ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment.

Launching ASUS Update

To launch ASUS Update, click **Update > ASUS Update** on the AI Suite II main menu bar.

Using ASUS Update

Select any of these options to update the BIOS:

- **Update BIOS from Internet**

  Allows you to download the latest BIOS version from the ASUS website at www.asus.com and follow the onscreen instructions to update the BIOS.

- **Download BIOS from Internet**

  Download the latest BIOS version from the ASUS website at www.asus.com and save it for later use.

- **Update BIOS from file**

  Use the BIOS file that you had downloaded and saved to update the system BIOS.

> Updating the BIOS poses some risks such as system instability or failure to boot. Before updating the BIOS, ensure that you back up the original BIOS file.

6.3.5   MyLogo

MyLogo allows you to customize the boot logo, which is the image that appears on the screen during the Power On Self Tests (POST).

Launching ASUS Update

To launch MyLogo, click **Update > MyLogo** on the AI Suite II main menu bar.

Select the option that you want to use to update your boot logo, click **Next** and follow the instructions below.

Change the boot logo of a downloaded BIOS file and update (or do not update) this BIOS to the motherboard

1.   From the **BIOS file** field, click **Browse** to locate the BIOS file.
2.   From the Picture File field, click **Browse the image for your boot logo**, then click **Next**.

3.   Do any of the following:
       •   Click **Auto Tune** to adjust the image size or the image resolution.
       •   Click **Booting Preview** to preview the boot image.
4.   Click **Next**.
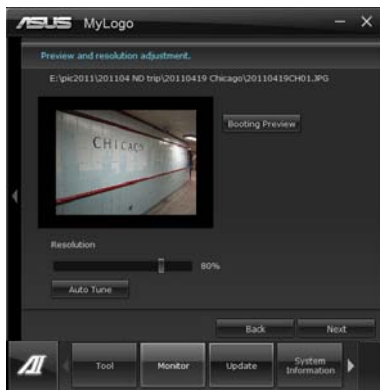
5.   Click **Flash** to update the boot logo.
6.   When prompted, click **Yes** to reboot the system. You will see the new boot
       logo the next time you start up the system.

Ensure to enable the **Full Screen Logo** in BIOS to use this feature.

6.4　Audio configurations

The Realtek® audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Sensing function, S/PDIF Out support, and interrupt capability. The CODEC also includes the Realtek® proprietary UAJ® (Universal Audio Jack) technology for all audio ports, eliminating cable connection errors, and giving users plug and play convenience.

Follow the installation wizard to install the Realtek® Audio Driver from the support DVD that came with the motherboard package.

If the Realtek audio software is correctly installed, you will find the **Realtek HD Audio Manager** icon on the taskbar. Double-click on the icon to display the Realtek HD Audio Manager.

Realtek HD Audio Manager

A.　　Realtek HD Audio Manager for Windows® 7™

Configuration option tabs (vary with the audio devices connected)

Device advanced settings

Information button

Control settings

Exit button

Minimize button

Set default device buttons

Connector settings

Analog and digital connector status

B.   Realtek HD Audio Manager for Windows XP

Configuration options

Control settings window

Information button

Exit button

Minimize button

•   Refer to the software manual in the support DVD or visit the ASUS website at   www.asus.com for detailed software configuration.

•   Due to Intel® Z77 platform does not support Windows® Vista™, Realtek HD Audio driver is only supported by Windows® 7™/Windows® XP™.

•   To play Blu-Ray disc, make sure to use an HDCP compliant monitor.

6.5   System recovery

The system **Recovery Partition** (F9 Recovery) and the **Recovery DVD** assist you in reinstalling the OS and restoring it to its original working state. Before using the Recovery Partition or the Recovery DVD, copy your data files (such as Outlook PST files) to USB flash drives or to a network drive and take note of any customized configuration settings (such as network settings).

> We recommend that you recover the system using the Recovery Partition for faster system recovery. If the Recovery Partition on the hard drive is failed or deleted, use the Recovery DVD for system recovery.

6.4.1   Using the Recovery Partition

1.   Turn your system on then press <F9> when the ASUS logo appears.
2.   The **Windows Boot Manager** window appears. Select the **Windows Setup [EMS Enabled]** then press <Enter>. Wait when the **Windows is loading files message** appears.
3.   After the system reboots, an **ASUS Preload window** appears. Press **Next** to continue.
4.   Select **Recover Windows to first partition only.** This option deletes only the first partition, allows you to keep other partitions, and creates a new system partition as drive "C".
5.   When a window appears querying **Are you sure you want to recover now,** click **Finish.** The process percentage is displayed on the screen.
6.   When a **Recovery finish** message appears, click **OK** and the system restarts. After it restarts, follow the onscreen instructions to complete the system configurations.

6.4.2   Using the Recovery DVD

1.   Turn your system on then press <F8> when the ASUS logo appears.
2.   Insert the Recovery DVD into the optical drive when a **Please select boot device** menu appears. Select the optical drive as the boot device then press <Enter>. The system restarts.
3.   After the system reboots, an **ASUS Preload** window appears. Press **Next** to continue.
4.   Select where to install a new system. Options are:
      Recover system to a partition:
      This option deletes on the partition you select from below, allows you to keep other partitions, and creates a new system partition as drive "C".
      Recover system to entire HD:
      This option deletes all partitions from your hard disk and creates a new system partition as drive "C".

5. Follow the onscreen instructions to complete the recovery process. Remember to back up all your data before starting the system recovery process to prevent losing any important data.

6. Insert the Support DVD into the optical drive when prompted. Click **OK** and the system reboots.

7. After the system reboots, Windows® begins system configurations. Follow the onscreen instructions to complete the process then restart your computer.

> This Recovery DVD is for ASUS Workstations only. **DO NOT** use it on other computers. Visit the ASUS website at www.asus.com for updates.

Appendix

This section provides a troubleshooting guide for solving common problems when using the barebone workstation.

A.1   Simple fixes

Some problems that you may encounter are not due to defects on the system or the components. These problems only requires simple troubleshooting actions that you can perform by yourself.

Problem	Action
The power LED on the workstation or on the monitor do not light up	1. Check if the power cable is properly connected to the power connector in the system rear panel.
	2. Ensure that the power cables are connected to a grounded power outlet.
	3. Press the power button to make sure that the system is turned on.
The keyboard does not work	Check if the keyboard cable is properly connected to the PS/2 keyboard port.
The mouse does not work	Check if the mouse cable is properly connected to the mouse port.
The system does not perform power-on self tests (POST) after it was turned on	1. Check the memory modules and make sure you installed the DIMMs the system supports.
	2. Ensure that the DIMMs are properly installed on the sockets.
The system continuously beeps after it was turned on.	1. Check the memory modules and make sure you installed supported DIMMs.
	2. Ensure that the DIMMs are properly installed on the sockets.
The message "Non-system disk or disk error" appears	1. Check if a bootable HDD is active.
	2. Check if the HDDs are properly installed.
Network connection not available	1. Ensure that the network cable is connected to the LAN port on the rear panel.
	2. Ensure that you have installed the LAN drivers from the support CD.

ASUS contact information

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* EUR 0.14/minute from a German fixed landline; EUR 0.42/minute from a mobile phone.